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THE PRACTICAL TEACHER

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The Yarmouth Conference: Candidates for the Vice-Presidency.

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BY MANY HANDS.

"Quot homines, tot sententiæ."

THE story of a great life is of incalculable value to the teacher. To descant on abstract virtue is merely to waste sweetness on the desert air. But to seize the moment when attention is directed to a great personality, and to illustrate the noble qualities, the steadfastness of purpose, the devotion to duty, the outstanding morality which give it its distinction—this is teaching which allies itself so closely with time and circumstance that it cannot fail to leave its impress on the mind and character of the scholar. Viewed in this light, the passing of the greatest sovereign of British history—the greatest, because morally the best—is an event of the utmost importance to the teacher, as teacher. As a citizen, he pays his sorrowful tribute to the faithful stewardship of mighty things which signalised his dead Queen; as a subject, he honours her memory for the royal virtues that showed no spot or blemish in the fierce light that blazed upon her throne; as a teacher, he blesses the life which, in its purity, nobility, tenderness, faith, courage, and devotion, furnishes him with a thousand lessons for the citizens of the future. The Queen is dead, but all is not over and done. "The path of the just is as the shining light, that shineth more and more unto the perfect day."

The Passing of Victoria the Good.

❧ ❧ ❧

A PROPOS of Mr. George Bernard Shaw's *Three Plays for Puritans*, *The Academy* has a racy article on the author himself. In summing up the phases of "G. B. S.," the writer has made one omission. "He has been political reformer, novelist, art critic, musical critic, dramatic critic, vestryman—and still follows sundry of these vocations," says *The Academy*. It should also add—"educational reformer." For one brief turn did he perform before a dazzled and bewildered audience, who watched him much as the mother bird did the transformation of her "ugly duckling" in the fairy tale. We had the good fortune to be present on the one occasion when a body of listening teachers heard the gospel of education according to Shaw expounded. For sparkling wit and unsurpassable impudence it bore off the palm. Needless to say, it contained many truths, and many deadly home-thrusts at our present system; but as a world governed by a constitution evolved by "G. B. S." would be a topsy-turvy one, in which, perforce, we should have to stand on our heads, we are glad that he doesn't represent the Education Department. But then he is too witty and lively a subject ever to be bound with red tape. As for his versatility, we have shown that it is even greater than his *Academy* critic believes.

Concerning "G. B. S."

❧ ❧ ❧

THE current *Westminster Review* contains a pretty, logic-chopping article, under this title, on the distinction between "real" and "nominal" definitions—in other words, the impossibility of defining the incomprehensible. With the article itself we have no intention of meddling; it is the title that has attracted us—it fits so well to a number of things in the educational world, and describes so accurately our present condition.

"When the Indefinite is the True."

For us, the indefinite *is* the true. Thirty years ago, people thought something definite had been done in education. To day, no one knows exactly where we are or what we may do. The indefinite, alas! is the true.

We are in the frame of mind of the American who defined a gentleman as "everybody who is not a lady"—indefinite, but true.

We have been excited over technical education, commercial instruction, modern languages, manual training, by turns or all together. Examine the result as a whole, and you'll find that this horrid cuckoo-phrase fits in again only too well. The indefinite is the true.

The nations of the world who are striding ahead are those who have had the wit to see in some departments exactly what they wanted, and then to formulate some definite means of getting it. For them the indefinite is the false, and only the definite is the true. We feel almost inclined to quarrel with a writer who has hit on a phrase so descriptive and so haunting. Perhaps after the perturbation of recent discussions and decisions something definite will be precipitated, on which we can act, and forget that ill-omened phrase, "The indefinite is the true."

❧ ❧ ❧

"REGINA *v.* COCKERTON" is the starting-point for a homily by Sir Joshua Fitch in the current *Nineteenth Century*, in which, however, he brings nothing new to the controversy. He merely re-states the arguments that have been heard *ad nauseam*. In one respect he muddles the issue by confusing together higher-grade work and the work of evening continuation schools, and calling the whole continuation work. It is desirable that the two things should be kept separate, both in mind and practice, for it is one thing to *complete* your primary education as far as you can, and another to try to fill the gaps in the education of those whose first education has been of a dilapidated and shortened kind.

Higher-Grade Work and the Official Mind.

And we protest against the everlasting justification of the "Higher Minute" by comparison with French schools. Sir John Gorst has just said at Manchester how necessary it is for each country to work out its institutions in its *own* way; and yet, to listen to the comparisons that are constantly made, one would think we were about to model our primary schools on the French plan. We don't want the French system of primary schools, with their three courses and encyclopedic curricula. Nor do we want the "leaving certificate," which is indispensable to admission into the *écoles primaires supérieures*. On that head we recommend to our home-grown wiseacres a course of reading which appears in the French educational journals. The outcry against the *C.E.P.* (*certificat d'études primaires*), as it is called, would convince anybody who needed convincing. If they are then unconvinced, let them read M. Picavet's monograph in the admirable series published by Flammarion on French national life.

Sir Joshua's peroration is pathetic. He sees "a great department of the state, representing all the noblest aspirations of the community," and so on. This is the apocalyptic vision of the official mind—the apotheosis of the Education Department. We are sorry we don't share his enthusiasm. We had a revival of hope after the unification of the various departments; but recent events have brought about the disthanasia of our enthusiasm.

❧ ❧ ❧

THE letter of Mr. Yoxall to the daily press, *à propos* of the conduct of the crowd at the funeral of Queen Victoria, is certainly a justifiable one. There has been so strong a tendency on the part of a certain class of critic to call any display of ill-behaviour "Board-school manners," that any one might be pardoned for claiming some share in the striking exhibition of good taste and reverent feeling on February 2nd, as the effect of primary school education.

Honour where Honour is due.

The days of "deportment" as an extra, or of "twopence a week extra for manners," have long gone by. But those who really know anything about the matter know quite well that there is just as much real politeness, and also as much external civility, among school children, as when the article was regarded as a luxury, and paid for like "dancing and the use of the globes."

Of course it all depends on the point of view. Those who can see nothing good in a Board school put down everything that is bad as traceable to it. "Can anything good come out of Nazareth?" is their line of thought, and from that to the fulminating article in a recent monthly on "Board School Religion and Board School Manners" is but a step. The bad taste and flagrant assertions of that particular writer made us feel almost inclined to ask in what particular kind of establishment he had procured his own manners; but in trying to prove too much he proved too little, and we felt sure that his gibes would fall harmless.

Perhaps the day will come when Board-school manners will be considered as a praiseworthy epithet, even by the wilfully blind folk who now use it depreciatingly. Meanwhile Mr. Yoxall's letter is well-timed.

❧ ❧ ❧

WE have just read with great enjoyment a passage in the "Musings without Method" of the February number of *Blackwood*. It is another entertaining skirmish in the never-ending battle of the "ancients" and the "moderns," at which the humble teacher of modern languages can afford to assist as a spectator, posing as "Laughter holding both his sides." It is one more comical example of the case-hardened conservatism of the ancient, for whom there is but one literature, but one kind of learning, and for whom scholarship means nothing but Latin and Greek. What superb contempt for anything practical or useful! What scathing scorn of commerce, and mere commercial gents! What sarcasm for Lord Rosebery, who sees in English ignorance of French and German "a source of real danger to the nation!" We cannot attempt to correct all the ancient's fallacies. Besides, he is so supercilious and superior, that we approach him in humble fear and trembling. But with due deference we would point out that intelligence *is* required for the study of modern languages. A quick ear is a valuable aid undoubtedly, but still the cerebral faculties are also exercised. We trust that he will accept this as a fact, or experiment more thoroughly on these languages himself.

Ancient v. Modern.

Why does the "ancient" maintain that our universities must be jealously guarded against what is new and useful? Did the much-vaunted Greeks waste their whole time in studying the languages of the civilisations which had preceded theirs? Let the universities play their part in our national life. We are not insensible to the magic halo that surrounds classical antiquity; but we do not see why the youth of our nation should be debarred from assimilating the works of the best French and German thinkers. We cannot understand why there should be any question as to the right of students to ample facilities for the study of French and German at our universities. Place these languages upon an equal

BRITISH MUSEUM

footing with Latin and Greek, and let them stand or fall by their merits. That would soon end the battle. Classical learning is for the few, modern for the many.

* * *

Holiday Courses.

A SHORT paper in *The Educational Times* for February deals with certain Continental holiday courses. As a pioneer and explorer in this interesting field, we are glad to note that our contemporaries are awaking to the fact that these courses are an important feature of modern scholastic life. The writer evidently shares our keen appreciation of the advantages to be gained from a sojourn among foreign students and foreign professors. But the paper is somewhat marred by its tone of self-complacent superiority. The criticisms of the courses at Lisieux, Tours, and Elbeuf are amusing. The trivial examination at which no student fails, the huge, gaudy certificate which enables the smatterer to pose as a competent linguist, the inferior "professor," the absence of the true spirit of serious work—all these things are discussed in a somewhat *de haut en bas* style. We hate sciolism; but why tilt at the poor *maître de collège?* We ourselves derived more insight into the French language by chatting with a humble little *répétiteur* than from all the foreign "dons" we have ever known. The writer concludes that these Normandy courses, "where there is no true spirit of work, and where the professors are inferior," draw the English elementary teacher; while other courses which are free from these defects draw the "teacher of a higher class." The "mere elementary one" may resent this unkind innuendo, or he may pass it by with an indulgent smile. In any case, the fact remains that in our visits to the courses of French Switzerland, which are really of a very high character, we have noted with great regret the almost entire absence of English teachers, whether elementary or "superior."

* * *

The Symposium.

THERE is a curious form of journalistic enterprise—glorified sometimes by the name of Symposium—which appears likely to abide with us. A contemporary suggests that its appearance marks the observance of a new "silly season."

We may perhaps see the end of the thing when the cutting reply of the bored celebrity reaches the stage of the played-out. At the present time this appears to be the choicest morsel of the feast. It is certainly true that no collection of "replies" seems complete without at least one example of the rebuff direct. "I really haven't the slightest idea," was the most admired reply to a question as to the greatest need of the new century.

"Who is your favourite novelist, and what is your favourite novel?" is the question sent round by the catechist eager for copy for a February magazine. "I have no favourite novelist, and no favourite novel," is the curt rejoinder of Mr. Israel Zangwill; while Mr. S. K. Hocking waggishly says: "The best novelist in the world, so far as I can judge, is myself, and the best novel the one I happen to be engaged upon at the present or any other time."

* * * * *

The March number (note the season) of a five-year-old magazine contains the replies sent by well-known actors who had been sounded as to their "favourite parts." We admit a weakness for the dainty wit with which Mr. Beerbohm Tree concludes his letter of refusal: "My favourite part is discretion, which a foolish proverb declares to be the better part of valour."

"Dear Sir," runs the refusal of a well-known artist (this is in *February* 1896), "if you had asked me which of all my works I liked the least, I should have answered by writing, 'all of them.'" In the same number M. Savery gives as his favourite picture "always the one on which I am working."

* * * * *

An attempt upon the opinion of the late Lord Leighton proved unsuccessful. A pathetic interest attaches itself to the occasion, for on the death of the late president of the Royal Academy (which occurred a few weeks later) the proprietors of the magazine obtained permission to publish the following (from a private letter): "Every picture I paint begins in hope and ends in disappointment."

* * *

A Pleasant Hobby.

THE only way of preserving a spoken dialect is by means of literature, and those who view with regret, in the great tendency towards uniformity in speech, the ultimate destruction of the provincial dialects, will find some consolation in the works of Barry, Crockett, Maclaren, Hardy, "Q," Walter Raymond, William Barnes, and others; because the popularity of these writers is some evidence that the reading public, at any rate, are interested in the dialect of the provinces. Burns made Lowland Scotch a classical tongue. Barnes has done a similar work for Dorset, though, of course, it is not so universally known; and as the literary public demand, so will the literature be produced which will warm the hearts of dialect lovers. The worst of it is that so many writers attempt dialect work without an adequate knowledge of the dialect they are dealing with. They think a few misspelled words enough to answer their purpose. Many of our dialects are not "broken English," but ancient tongues, that have their roots back in the languages of the various Saxon tribes that made up the English nation.

* * * * *

The Tongue of Alfred.

JUDGE HUGHES tells us that if the shepherd of today who tends his sheep upon the slopes of the Wiltshire Downs were suddenly confronted by King Alfred the Great, the two could converse in language that would be almost identical. This is extremely interesting, and should make us pause when we are inclined to deride the uncouth speech of the yokel. Cleanse this speech of the vitiating effects of modern slang, and you will find the tongue that was once spoken by kings, and that was written by the father of English poetry. For this reason the study of dialect is an extremely interesting hobby, especially for those who dwell in the country districts. Some of our country teachers have taken it up in this way, and are thus doing something to fulfil the burning desire of our young Oxford enthusiast.

* * * * *

Mr. Gregory's Experiments.

WE have before us a number of "experiments," as he calls them, of Mr. R. R. C. Gregory, in dialect work. Dialect is generally used by writers to express humour, pathos, and the simple details of village life. In the following verses Mr. Gregory has gone a step further. He has made an attempt to give expression, in the tongue of the west, to the feelings of patriotism which moved all Englishmen in the autumn of 1899. Whether patriotism thus expressed will appeal to the heart of a Londoner is a question, but it is interesting to know that it is a favourite recitation of at least two members of the Ex

ecutive, while a would-be member of that august body has included it in his platform *repertoire*.

A ZOJER O' THE QUEEN.

(One vrom Zummerset.)

Wold Tom stood at the barton geate--
  Young Tom lingered there too;
Wold Tom knowed that the time wer' laate,
  But t'other wer' loth to goo.
The wold'un had fought wi' "Fightin' Bob,"
  Auver to Candahar;
Young Tom's heart d' thumpy an' throb,
  Vor he is now off to the war.

The wold'un wer' proud o' his zojer zon,
  An' he slapped 'un upon the back,
An' thought o' the past an' what he had done
  Vor the Queen an' the Union Jack.
An' he knowed that Tommy ood do the zaame;
"Vight like a man," zed he—
"Vight like a man, an' honour the naame
  Thee hast got vrom thy mother an' me."

A lump did rise in the young man's droat,
  Vor his mother an' he wer' one;
He loved her well as a zojer ought,
  An' he wer' the only zon.
But he zed, "I'll do my duty, dad,
  An' ef they d' lay me low,
I'll die as becomes a Zummerset lad,
  Wi' my vaace towards the foe."

"Tommy, my bwoy, now gi'e I thy vist"
  (An' he sheaked 'un hard by the hand);
"A chip o' the good wold block thee bist,
  An' the block is o' woak, understand.
Hold up thy head, lad, keep up thy heart;
  I'll measure thee once more down.
Ees. Thee'll do. As straight as a dart!
  An' a zojer vrom voot to crown!

"Tommy, my bwoy, when auver the zea
  To voreign lands thee bist gone,
Thy mother an' I 'ull pray that thee
  Med zaafly be guided on.
An' when—wold England lef' behind—
  Wi' rattle-brain pals thee dost roam,
Remember, Tommy, to have a mind
  Vor the two wold volk at hwome.

"I'll rade what's on the paapers, zee,
  That every week comes out,
An' vancy that I be there wi' thee
  When the bullets be vlying about.
An' when the wold ooman d' think upon't,
  An', mebbe, mope and cry,
I'll tell her about the glory on't—
  Vor the good wold vlag to die.

"An' zo, good-bye, an' God bless 'ee, bwoy;
  Goo now, an' doant miss thy train.
My heart d' ache, but I look vor the joy
  O' having thee hwome again."

* * * *

They parted theer at the barton geate,
  Thik braace o' zun-browned men;
They parted theer, but the day they'll meet—
  The gurt wise God knows when.

* * * *

Theaze be the bwoys that d' carry the faame
  O' England athirt the zea;
Theaze be the bwoys that d' maake the naame
  O' the land that's the land o' the vree.
Droo the desert, athirt the plain,
  Droo ice to the vroze-up north,
Daring death in the zouth zea main,
  Theaze English bwoys goo vorth.

They drain the valley, they climb the height,
  They furrow the barren karoo,
They larn the niggers to rade and write,
  An' live as volks ought to do.

An' where there's danger or work at han',
  Vightin', labour, or plaay,
'Tis there you'll vind a Zummerset man,
  Stiddily pegging awaay.

R. R. C. GREGORY.

SCHOOL PUNISHMENT.

BY T. A. ORGAN,

Barrister-at-Law of the Inner Temple and Oxford Circuit; Author of "The Law Relating to Schools and Teachers," etc.

IN this article it is proposed to set out as concisely as possible the powers of a teacher in the matter of school punishment. The basis of these powers is the common law right of a parent or guardian to reasonably punish a child. The parent or guardian may delegate such right to the teacher of the child. Such delegation is incidental to the contract which is entered into between a parent when he sends his child to school and the schoolmaster when he receives the child as a pupil. It is an implied condition of such a contract that the parent gives to the schoolmaster the same right of punishment that he, the parent, possesses. At the time of a child's admission to a school, or at any time after admission, it is open to the parent to withdraw from the teacher the power to inflict punishment; and, of course, it is equally open to the teacher or governing body of the school to refuse to admit the child, if the parent insists on no punishment being administered under any circumstances. If the subject is not mentioned either by parent or teacher, then the teacher has an undoubted right to inflict such punishment as he may consider necessary, having regard to the interests of the child and his schoolfellows, and also having regard to the restrictions and conditions hereinafter stated.

It has already been said that either parent or teacher may specially exclude from the contract the right and duty of punishment. Comparatively few teachers possess complete freedom of contract in this matter. In the large majority of instances the teacher is the servant either of governors, School Board, or school managers, and the real contracting parties are not the teacher and the parent, but the school authority and the parent. If the teacher contract with the parent in such cases, it is in his capacity as agent to his employers, who have power to lay down the conditions which shall be imported into such contracts. If no regulations as to punishment are made by the governing body, the parent's power to punish is delegated to the teacher by implication. But many governing bodies have made regulations respecting the infliction of punishment. These conditions are binding on the teachers in the service of such governing bodies, as they form part of the contract entered into between the governing body of the school and the parent of the scholar.

In the first paragraph it is mentioned that there are restrictions on the power of the teacher to inflict punishment. The most important of these restrictions are set out in the following proposition: "Punishment must be moderate and reasonable, and not inflicted for the gratification of anger. The power to inflict punishment must not be exercised arbitrarily or capriciously."

First, with regard to the "moderate and reasonable" character of the punishment. Whether any particular punishment is "reasonable" must depend on the circumstances of the case. A very severe punishment for moral delinquency would be reasonable, while an equal punishment for a trivial breach of school discipline would be unreasonable. To inflict the same punishment upon a six-year-old weakling as upon a healthy lad of thirteen would be unreasonable. In one of the leading cases on this part of the subject the law is thus stated: "By the law of England the parent or schoolmaster (who for this purpose represents the parent, and has the parental authority delegated to him) may, for the purpose of correcting what is evil in the child, inflict moderate and reasonable corporal punishment, always, however, with this condition, that it is moderate and reasonable. If it be administered for the gratification of passion or rage, or if it be protracted beyond

the child's power of endurance in all such cases, the punishment is excessive and violent, and is unlawful."

The reasonableness of the punishment must be determined by the varying circumstances of the particular case. It is assumed that a teacher acts reasonably when inflicting punishment, and in the event of a prosecution or an action at law, the burden of proving unreasonableness rests on the prosecutor or plaintiff. The presumption is that the teacher has done only his duty.

Punishment must not be arbitrary or capricious in its character. For any punishment there must be a cause which a reasonable teacher honestly believes to require correction. In this connection it is most important to point out that, before punishment, the teacher should thoroughly satisfy himself that the cause for punishment exists, and that he is about to punish the real culprit; in fact, the process in the teacher's mind should be equivalent to that which takes place every day in courts of justice. In serious cases the process should be actually similar to the court process, and not merely a series of operations in the mind of the teacher. The culprit should be charged with the offence, and if he admits the charge, the teacher should administer punishment in proportion to the gravity of the offence. If the culprit denies the charge, such evidence should be taken as fully satisfies the teacher that the charge is true, before any punishment is administered.

Various questions arise in respect of the mode and instrument of punishment. The mode of punishment, the instrument, and the part of the body upon which the punishment is inflicted, are left to the discretion of the parent or teacher, provided always that neither the instrument nor the part of the body is such as renders it probable that the punishment will result in permanent injury to the child. Thus, if a teacher correct a child, it must be with an instrument suitable for correction, and not likely to inflict serious injury, the age and strength of the child being duly considered.

The nature of the instrument used may be evidence of the motive for punishment. It would be presumed that a punishment inflicted by a teacher with the cane ordinarily used for such punishment was not administered to gratify anger, but the use of another instrument would be presumptive evidence against the teacher's calmness and judicial spirit at the time when the punishment was administered. The instruments in common use, and against which no objection has been raised in the courts, are the cane, the birch, and the tawse (a leather strap, the operating end of which is divided into a number of strips). The use of the tawse is almost confined to Scotland, but of recent years it has been introduced into England in a few instances. By far the larger number of the School Boards prescribe the cane as an instrument of punishment, but the School Board for London leaves it to the discretion of the head teachers of infants' departments to use and permit the use of the open hand instead of the cane.

The part of the body upon which the punishment should be inflicted is nowhere specifically stated. "There is no chart prescribed by Parliament showing the particular regions of the body to which corporal punishment in schools is to be confined." The question of the legality of caning on the hand has been the subject of a High Court case. A magistrate of a London court was of opinion that punishment by caning on the hand was necessarily attended by risk of serious injury, and hence he convicted a teacher of assault because he had so caned a scholar. When the case reached the High Court the conviction was quashed, it being held that it was not criminal for a teacher to punish a pupil by caning him on the hand. In another case the judge said: "We have illustrations from classical times, in addition to the case I have quoted from Juvenal, indicating the practice of inflicting corporal punishment on the hand, and that is a practice which appears to have commended itself to the common sense of mankind, and to have continued down to the present time." The general rule is that great discretion should be exercised as to the part of the body upon which the blows fall. Blows on the head or any other part of the body liable to permanent injury should not be inflicted under any circumstances; for if the punishment is calculated to produce danger either to life or limb, it is excessive and unlawful.

As to the time and place of the offence, it has been decided that the authority of the teacher to punish his scholars is not limited to acts of misconduct committed by them on the school premises and during school hours; but this statement must not be regarded as conveying the idea that there is no limitation to a teacher's power to punish for an offence, wherever and whenever committed. It has been definitely decided that the parent delegates to the teacher an authority to deal with a child not only in the school, but to deal with him in those cases in which complaint is brought to the notice of the teacher of improper conduct occurring between the child's home and his school. This is more especially so when the offence is committed towards one of the children attending the school. In an American case which was tried in 1887, it was decided that a master had power to punish a boy for fighting, although the fight took place out of school hours, and not within the boundary walls of the premises.

Expulsion is a form of punishment, and is justifiable if the conduct of the child is such that he cannot be retained without danger to the school. It is regarded as the most severe of school punishments, and the teacher cannot be said to have an absolute discretion in exercising the power of expelling. The courts regard expulsion as a very serious procedure. In a famous case the judge said: "I am prepared to hold that there is no such absolute discretion in the masters of schools as that claimed in the governors' statement of defence, as it was originally pleaded. Such a power would be far too dangerous — namely, that any boy at school would be liable to be branded for life by expulsion, simply because a master, on his sole authority and discretion, however distinguished he may be, had come to the conclusion that such a course was necessary for the well-being of his school. Such an absolute discretion could never be permitted."

Teachers in public elementary schools are relieved from the responsible duty of deciding as to the expulsion or otherwise of a pupil. The Board of Education hold that the power of expulsion must always be exercised by the managers of the school. It is a power which cannot be delegated to the teacher. However good the reason for expulsion may be, if the power is exercised by the teacher, the Board of Education consider the expulsion to be irregular. It is suggested that the managers of a public elementary school should give to their head teachers the power to *suspend* a pupil from attendance at any time, from causes which may appear to the teacher to be sufficient; that the suspension should be continued until the managers have had an opportunity for investigation; and that, in the event of the managers forming an opinion that expulsion is desirable, the facts of the case should be submitted to the Board of Education for advice before expulsion is finally determined on.

TALKS WITH TEACHERS ON PSYCHOLOGY.

II.—MEMORY IN THE SCHOOLROOM.

BY JOHN GUNN, M.A., D.SC.

II.

IT really seems, then, that the fault described as too much exercise of the memory can be best cured by more exercise of the memory. It cannot be otherwise if memory is the fundamental fact in all learning—in real or science teaching as well as in verbal or linguistic. And that memory is the basis of all the knowledge we can impart is, I think, evident if we examine other mental operations sometimes set in opposition to memory.

Take "observation," for instance—a term much used and much abused in educational writings. You look at an orange, and what do you see? Just what was seen by the

patient mentioned in an earlier part of this paper. He saw the yellow patch of a circular shape, and it conveyed no meaning to his mind: he did not recognise it. Now that yellow disc is all that any of us can see. The orange, thing and name, with all its qualities, is *not* seen. It is only *suggested*. Given the yellow colour present, we remember the rest. Seeing, as Berkeley teaches, is merely suggestion by means of certain visual signs. You seem to *see* all that you *know* about the object or remember at the time. The less you know about it the less can you see, though the visual sign is there all the same. And the child, who *knows* less than you do, *sees* less than you do. Hence the great danger of a teacher assuming that when a pupil has an object before him, he sees it as the teacher does. No mistake does more to make an object lesson unfruitful, and yet it is a mistake which needs to be carefully avoided, for it is one that is very easily made.

The same remarks apply to the exercise of the other senses, such as hearing. You hear a friend speaking in the next room in tones which indicate some special feeling, say of anger. But a stranger would hear much less than that, though as acute in hearing as yourself. The tone suggests to you a host of ideas spontaneously aroused by the tone of voice. But few indeed of those ideas enter by the ear; the remainder are purely matters of memory and knowledge.

More than this, all the real elements of our knowledge are not matters of reasoning at all, but are matters of pure mechanical memory—*brute* memory, we might say. There is no *reason why*. Certain qualities of colour, taste, etc., are united in an orange. There are the separate facts. They might have been different, but there they are, to *remember*, and not to reason out. Two gases, oxygen and hydrogen, combine in certain definite proportions to form water—another series of facts, irrational facts, simply to remember, and not to be taught otherwise. And when we come to names, which seem almost a part of the common things and persons around us, the name is simply an additional fact; there is no *reason* to connect them. You cannot get round this by the derivation of the name: you will only reach root-words which have certain meanings attached to them—other names for other things, all equally arbitrary. And if you appeal to the laws of language, these are still arbitrary, and things to remember. Nay, if you fall back on the form of the speaking apparatus as explaining language, you only land upon other facts, mere facts, which have no perceivable reason for being as they are.

There is nothing in the last resort but pure brute memory to rely on. We cannot substitute reason. And if we could, we should be still in this position, that reasoning itself depends on memory for its materials.

Enough has been said to show the function of memory in the acquisition of knowledge, and to show conclusively that all knowledge, and not merely what is called memory knowledge, depends fundamentally on memory in the form of suggestion or association.

I may be taken to task for this account of knowledge, and told by some critic that I have proposed a merely sensational theory of knowledge; and my critic may continue that I have thus followed an unworthy school of philosophy, leaving no room in my theory for the necessary truths of reason itself.

I am quite aware of the position, however, and my statements have been made in full view thereof. The exposition I have undertaken is entirely psychological and historical, not metaphysical. I am concerned only to discuss *how knowledge grows*. It is quite a different matter to ask *what the fact of knowledge implies*. The former, the growth of knowledge, is merely a question of historical fact or empirical psychology. The latter, the question of what the existence of knowledge implies, is a much more troublesome subject. We call it by the name of *epistemology;* we recognise that it leads us into a metaphysical region, and we pass it by. Sufficient for our present purpose is it to discuss how knowledge grows, and especially how it grows in the schoolroom.

Our next question, then, must be as to the practical training of the memory, or how to exercise it so that real knowledge may result.

As to the study of common things, which is a great part of early school work, we get much help from Herbart, though he makes little mention of memory in his discussion. Perhaps his doctrine of apperception might be made clearer, at least to some minds, if the working of the laws of memory were given some more definite place in it. The ideas already in the mind, he tells us, lay hold of other similar ideas without, and in this way our present knowledge grows by the addition of fresh observations of a similar kind. The ideas you get from a scene depend on the kind of ideas already in your mind. This is true and eminently helpful. But we must be careful as to what we mean by an *idea*. It may be quite true that the sight of an orange calls up to a botanist a host of ideas connected with the fruit—its structure, and growth, and the like—while to the ordinary boy it only calls up an idea of its proper use, which makes his mouth water. But we have already gone a long way ahead of the simple idea before we reach the orange. The point to note at present is that the yellow colour, which is the only sensation present, *does not* call up similar ideas of colour—of various shades of yellow. It calls up ideas of taste and smell, or memories of fruit structure, and those ideas have nothing in common with the idea of yellow colour. So the first use of memory is to bind together a group of *wholly dissimilar* ideas—all the qualities of the object, and the sound of its name. Until these ideas are associated so that any one of them—colour, smell, or sound of name—will recall all the others in a flash, we cannot be said to *know* what is meant by the word "orange."

Now the first stage of knowledge is just this mechanical memory-working with reference to the common things around. The bonds are formed partly by repetition and partly by vivid attention or strength of stimulus. It does not require many repetitions of the stimulus to connect together, for example, the appearance of flame and the sensation of heat; the force of brain energy or of attention makes frequency of repetition unnecessary, although the two ideas are related only by accident, as we may say, and have no rational connection.

In early childhood, then, memory of the groups of qualities which we call things, and memory of the sound of the names by which they happen to be known, build up a foundation of empirical knowledge. At school we explore the nature of things more fully, and discover their relations to one another or to ourselves. Here, also, we must follow nature's laws, and keep the stimulus of the actual thing alongside of the sound of the name. A fact which is only expressed in words is usually very weak as a stimulus to brain activity, especially when all the world outside is offering in competition sight stimulus and other forms of sense stimulus. Hence we often say that our words go in at one ear and out at the other.

Ideas conveyed only in words are a feeble stimulus to young children, and leave poor connections behind. Accordingly, teachers fall back on repetition, and make the children repeat over and over again the words expressing the idea. You have all heard children doing so. I am sceptical as to the result. I have tried it sometimes. I have had the words repeated after me, then again, once again, and so on. I have sometimes found that they were correctly repeated the first time, with hesitation the second time, then with a mistake, then a total breakdown. Then the child stopped, pulled himself together, thought a minute, and repeated them correctly once more. How is this? The cause is, that such repetition is usually accompanied by *waning attention*. The monotony diminishes the energy, more especially as the pupil thinks he knows the words already, and need not keep up attention. But the consciousness of error and the fear of consequences renewed attention, and restored the memory. In fact, this device of repetition violates the law of *variety*, which we saw to be one of the conditions of brain activity.

The practical lesson from this is just what underlies all successful apperception: let there be the proper ideas called up beforehand to receive and assimilate the new idea; and this implies that proper stimulus is used—stimulus of sense in young children, with stimulus of interest and alert attention. Then the idea will be at once laid hold of, connected with other ideas which were called up in the presentation, and fused into the mass of knowledge. It is the old law of association: when two ideas are vividly present to the mind

at one time, or when two brain centres are excited together or in close succession, the state of mind, or the state of brain, whichever side you prefer to consider, will tend to recur in its entirety when it recurs in part.

Now, as regards impressiveness, or strength of brain stimulus, we may construct an ascending scale of teaching devices. Suppose the teacher wishes a certain fact to be remembered, he may proceed in any of these ways:—

1. He may simply *tell* the fact. If it is one which arouses interest, such as the announcement of a holiday, one telling may suffice for memory.

2. He may *repeat* the statement several times—a common device with teachers whose devices are few.

3. He may repeat the statement *in different words*. This is better; the same idea is connected with varied paths of sound-memory or words.

4. He may *write* the statement on the blackboard. Here we have stimulus through the eye, and the suggestion or even the actual presence of sound stimulus as well.

5. He may require the *class*, or some of them, to *repeat the statement*. This ensures greater brain activity, for more energy is implied in action than in mere ideation.

6. He may require the *pupils to restate the fact in other words*. This is a long step in advance for securing activity and attention.

7. He may require them *to write the statement* in their notebooks. Here hand, eye, and memory of the teacher's words are all combined; and many people recall more easily words *seen* than words *heard*.

Other devices may occur to you, but the principle is the same throughout. A clear first impression is favourable to permanent memory.

Next, we may notice this principle, that memory of a fact is made sure by the number and nature of the bonds which link it to other things. You never can lay your hand *directly* upon a thing in that storehouse of which Locke speaks. But everything is tied to some other thing; and if you feel along the string in the right direction, you will come to what you want in the long run. In fact, each thing is tied to *more* than one other thing. The strings cross and interlace in a network of enormous complexity. If you want a thing to be easily reached, the more strings you have to it the better; there is the more chance of hauling it into the light of consciousness when needed.

Let me give a simple example. When was Robert Burns born? I am not a member of any Burns Club, and so, when the question first occurred to me, I could not tell the date. But I suddenly remembered his own account of the event—

> "Our monarch's hin'most year but one
> Had five and twenty days begun."

Well, "our monarch" was George the Second, and he died, or at any rate George the Third began to reign, in 1760. So the date of Burns's birth must be January 25, 1759. Observe the links: Burns's birth calls up, not its date, which I had forgotten, but his own account of his birth in "Rantin', rovin' Robin." I know the history of the poet well enough not to take the wrong "monarch," and then I recall 1760 as the beginning of George the Third's reign; for it happened that I was once obliged to learn the British sovereigns from Egbert to Queen Victoria, with their dates of accession. I need hardly add that most of these are long since forgotten.

If you were asked just now to enumerate the chief exports of New Orleans, how would you set about recalling them? Would the list you once learned from your geography books recur to your mind? I think not; I almost hope not. But you know something of the climate of the Southern States, and that will keep you from going far wrong. Then you have read *Uncle Tom's Cabin*, and that will suggest cotton. You may have read other stories and sketches about the locality, and so you risk mentioning cigars, and perhaps fruit. What the chief exports really are I need not stop to inquire. The point is, how you that once knew them, and may have forgotten them, will recall the old facts.

Once more, when did the Pilgrim Fathers land in America? As I write down the question, I am as ignorant of the date as any one can be. I might begin by remembering the causes of their emigration, and arguing that it must have been between 1603 and 1625, the limits of our British Solomon's reign. Instead of this, the picture suddenly rises up to my mind which accompanied the story in one of my old school books—the Pilgrim Stone, as it is called, on which they are supposed to have landed—and on that block in the picture was carved in large figures the date, 1620.

These examples show, then, that we recall things by the aid of other things which have been formerly connected with them in our minds; and the more of such connections we make, the more easily do we recall. Such connections, again, should not be made haphazard. The picture of the Pilgrim Stone is a purely accidental clue, and if my memory had been well trained, I should no doubt have fallen on some connection more reasonable. Yet even such accidental clues should be seized upon and made use of by teachers in their daily work. They often appeal to the pupils' interest, and make more permanent links than others that are more reasonable. Visual links such as pictures are specially interesting to young children.

We cannot forget, however, that our pupils have a great deal to learn by memory of such a nature that we cannot make many links, especially reasonable links, to aid in recall. Take the letters of the alphabet, for example—their shapes, names, and powers. In such cases repetition and familiarity must be our mainstay; and in such cases especially let the sense stimulus be strong. Let there be big type, pretty colours, motor stimulus in making the letters, slow advance, small classes, and short lessons. In this way the *a* and *b* become known in their various properties, as the orange and the fire became known. Spelling, again, is a cruel burden to many a young memory. Once more, short lessons, alert attention, and making or building the words, aid in vivid stimulus. Words also can be grouped so as to help each other, even in our erratic language. But with so unreasonable a class of facts one rule is of great use: Don't ask a pupil to spell a word orally or in writing unless you are almost sure he can do it *correctly*. Why? Because if he once does it *wrongly*, he has formed a mental picture of the word, oral or visual, which he is just as likely to reproduce afterwards as the right one. You can't rub it off his memory as you can rub it off his slate. Hence an unprepared or badly-prepared dictation exercise is as bad an educational exercise as can be imagined. It simply stores the memory with misleading pictures, which may come back again at any moment in place of the true ones.

The facts and dates of history make up another common memory burden. I mentioned this subject to a friend the other day, and he seemed at once struck by a bright idea.

"You are studying the question of memory," he said, "and you should be able to help me just now. I have a lot of dates to get up—some hundreds, I suppose—for an examination. How should you recommend me to set about it?"

This was a serious problem for him, and just then it seemed serious for me too; for surely I could have little claim to write on memory if I could not tell him how to get up his dates. But I put on what was meant to be an air of dignity mingled with reproof and a small percentage of pity, and replied: "My dear fellow, you mistake me entirely. I am considering memory as a means of education, not as an instrument for learning dates in order to pass an examination; the two things are quite distinct, and indeed antagonistic."

And, after all, I believe there was some truth in my answer. These dates used to bulk largely in history teaching in my school days—now so long ago that perhaps the pupils of to-day are not troubled with them. Dates are of little historical value except to one who is already a fair historian, just as the latitude and longitude of a place are of little use to one who is only beginning geography. Each set of figures helps the educated man to *orient* his facts; it describes a locality in time or in space. But to the learner such figures have no significance. To the expert, a manuscript or a building may be described as of the tenth century or the sixteenth century, and the words will convey to him a definite mean-

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OUR SKETCH OF THE N.U.T. PRESIDENT.

WITH ILLUSTRATIONS OF CONFERENCE TOWN.

ing; to most people, the description would be useless. So an event of a certain period can be usefully dated to one who already has a general notion of what other events and characteristics belong to that period, but to a child the date is useless. Of course there are exceptions. There are certain events whose date forms part of their common name, as the Rebellion of the 'Forty-five, or the Reform Act of '32. There are other epoch-making events whose dates should be learned almost from the beginning, as landmarks for future reference. And when the teacher feels that a date is a *useful* fact, the date should be learned along with the event and connected with it organically. For the rest, dates which every one forgets when he leaves school should never be learned at all.

History need present no more difficulty to memory than fairy tales do, if learned in the same way and under the same stimulus—namely, interest and willing attention. Much of its difficulty lies in expecting children to remember what they do not understand. And to do this forms a vicious moral habit in the pupil—a habit which, under certain conditions, may become chronic, especially in those who are "in examinations oft." Such a habit produces answers like these: "The Salic Law prevents any man from inheriting the crown if he is descended from a woman;" or that, long ago, "instead of covering the floors of their rooms with carpets, the people strewed them with thrushes;" or that "Sir Thomas More wrote songs and poems, including *Cœlebs in Search of a Wife*, *Ye Mariners of England*, and *The Descent of Man;* and he was also a great preacher." In such cases we have not merely a failure to remember facts about persons and events. There is evidence that the student never knew them, and never hoped to understand them, but tried instead to remember certain phrases. Two very important things were evidently forgotten by the student: first, that the words of the text-book had a *meaning*, which meaning was more important and also easier to remember than the words; and second, that examiners expect the words of an answer to have a meaning, whether they form a full and correct answer or not. This whole class of failures in memory is due to trying to memorise words instead of meanings, or symbols instead of things. The fault is not in using memory too much, but in using it on the wrong set of ideas.

It may occur to you here that there is one form of memory exercise common in schools in which words *must* form the material of exercise. I refer to the learning of poetry. But even here, there are a better and a worse way of setting about it. The worse way is to sit down and con it over silently, time and again, until the words get joined on to each other in a single chain, each phrase recalling the next. In this case, the only stimulus is that from the eye, applied to what is, after all, *not* the word itself, but its written symbol. Now a word is first and chiefly a *sound*, and the legitimate stimulus would be the *spoken* word. No one would think of learning off a piece of music by merely memorising the written symbols. So a better way is to read the passage aloud from the first; the memory then receives at once the direct cue for repetition—the *sound* of the lines. But once more, poetry has more than meaning: the effect designed by the writer can only be reproduced when it is read with the proper tone and emphasis. If you wish to have these reproduced by your pupils in the end, see that you have them in the *beginning*. Unless proper expression, and proper gesture too, are used from the very first, they will come in later as a disturbing element. The pupil has, then, *two* series to recall—a series of words and a series of expression marks. The moment he feels uncertain about a word, he concentrates attention on the word series, and forgets his gestures and inflections entirely. But learned together, the two series become one linked series, and the memory of either acts as a help to recall the other.

The learning of poetry is sometimes recommended as an exercise for strengthening the memory. This naturally raises the question, Can the memory be so trained as to become more tenacious and ready? To answer briefly, it cannot. Professor James of Harvard University has made special research and experiment in this matter, and decides against the theory. What we *can* do is not to increase the power of the memory, but to direct it in special lines. The habit of learning poetry will not strengthen one's power of remembering names and faces, or of getting up the rules of German grammar. It will not even make it easier to learn the next piece of poetry, unless in so far as experience shows the best way of memorising.

And yet I know one, perhaps several, who can learn poetry faster and remember it longer than the average of my acquaintance. Is not this power due to the development of memory by practice? I think not. The power is originally due to the brain being naturally susceptible to auditory stimulus rather than visual. (I may mention, in passing, that the person who is in my mind has very little perception of form and colour.) This quality of his brain or mind finds its best satisfaction in the charm of rhythmical language; his interests lie chiefly in that direction, and his memory acts more surely and easily there than elsewhere: that is the whole explanation.

Natural bent, personal interest, and training, all determine special *types* of memory. One may come home from church with a full record of the sermon, another with a clear recollection of the hymn tunes, and a third with mental pictures of every new bonnet in the congregation. These differences are due not to the strength of memory, but to its direction. The direction of the memory is determined by the direction of attention, and that, again, by interest or by fullness of previous knowledge. It is the old story of the apperception masses at work admitting new ideas, and the law of habit confirming them.

What school work and education generally can do for *memory in general* must be done through the training of *thought in general*. The teacher can show how to study; how to concentrate attention on a rational train of relations instead of letting it wander at will; how to select the important points of a statement, and group the less important round that. And when the pupil learns how to tackle a subject, he learns at the same time how to remember it clearly. An uneducated person cannot tell a story straight through, as a rule, but wanders off into irrelevant bypaths. He does not give things in their true proportion. But this is just because he did not see them in their true proportion. The mind must be trained to limit itself to the main lines; life is too short, and energy too small in amount, to allow us to wander aimlessly through all bypaths.

One of the greatest difficulties you can put in the way of an arithmetic class is to set a problem containing some number or condition which has no bearing on the answer. It is difficult for the untrained mind to set aside *any* item as of no consequence. Yet this is one of the first conditions of clear thinking, and of clear memory as well.

A study of memory in the schoolroom can hardly close without at least a mention of what is known as *technical memory* devices, or *mnemonics*. In history, this was sometimes used for recalling dates. Each digit was made to represent some consonant, and by using these consonants as a skeleton, a word was built up which had some fancied association with the event. The pupil then recalled the key-word from the event, and built up the date from the key-word. In my own experience, I always found the date easier to remember than this mnemonic word. I knew one teacher who invented a whole book of such mnemonics for British history. I need hardly mention that history in his school was worse taught than in any school I ever saw. He had no time to teach the facts; the symbols took up all the energy of teacher and pupils alike. I do not say that mnemonics are useless; you may remember some things with their aid. But I am safe in saying that anything which needs such a clue to recall it is not worth remembering. If the fact has any reasonable connection with other things, or any *real* connection, whether reasonable or not, use *that* connection as the memory clue. If the fact has no real connection with anything else in the learner's mind, it can form no part of his knowledge; it is of no educational value, and it should never be learned at all. By such mechanical devices you might be able, say, to learn off the names of all the minor planets or asteroids. But if you are an astronomer, you will soon learn their names by mere familiarity, without mnemonics. If you are not an astronomer, you have no right to waste your time and energy in learning them at all.

To give a full treatment of this subject, with all the practical rules which follow from the principles laid down, would require no less than a full treatise on school teaching. We have already given all that seems essential in the way of general laws. The detailed application of those principles and laws must be largely left to the individual teacher.

The cardinal point I take to be this, that memory, in the widest sense, has done its perfect work when we reach the stage of knowledge, and therefore the proper exercise of memory is with the objects of real knowledge, and not of mere recollection.

What we know, we remember; what we only remember, we forget.

WITH OUR CHILDREN.

Concerning the Hooligan.

DOES Child-Study include Hooliganism in the field of its investigations? Why should it not do so? The Hooligan was a child not so very long since; he may be little better still—or a great deal worse. On the ground of his youth, and especially on the ground of his undeveloped mental and moral nature, the Hooligan may be regarded as a phenomenon not beyond the legitimate scope of the child-student. There are, indeed, strong reasons for recognising him in this column. Child-study, as is pretty well known, in the Western R public rejoices in the name of Genetic Psychology; and accordingly it should take some account of all psychic geneses. If, therefore, it becomes apparent that Hooliganism is in any way a result of some psychic genesis, some human instinct appearing at a definite stage of the development of the immature human being, this column is not an unfitting place for its discussion.

The position we would take up at present, then, is this: Hooliganism is not a purely artificial product, nor even a product of city life *plus* original sin; it is simply a perversion of a natural instinct—the club or gang instinct—which appears almost infallibly in boys at a fairly definite age. We do not mean this position to imply any palliation or defence of organised ruffianism. The moral aspect of it is not our present concern; that is too obvious to need exposition. We are concerned rather with its natural history.

The Genesis of the Hooligan.

A band of young ruffians may originate in either of two ways. They may band themselves together *because they are ruffians*, and find in joint action greater efficiency as ruffians, and at the same time less risk of consequences; or, on the other hand, they may indulge in ruffianism *because they find themselves already a band*, and that at an age when active mischief is a less evil in their eyes than mere idleness, or any passive state such as listening to a formal lesson or an improving lecture. Practically, no doubt, the result is the same. It matters little to the victim whether the ruffianism is the cause or the effect of the banding together. Yet to the ruffians themselves it matters much, and it matters much, too, to the community at large, whether merely spectators of this phase of city life, or reformers trying to abolish it.

> "How oft the sight of means to do ill deeds
> Makes ill deeds done!"

But though the deeds *are* done, they have then a different significance.

Again, we do not mean to affirm that Hooliganism is always to be regarded as merely the work of thoughtless, idle boys. It begins there, but it does not end there. The child of tender age who from any cause begins to deceive, and finds that deception *pays*, is apt to continue a course of deliberate deception. The origin was innocent; the development becomes immoral. So a gang who find that they can make profit of some kind out of combined mischief-working are very likely to continue this for the sake of the profit, and not merely for the fun of it, and other gangs may follow their example: we may thus have the graver phenomenon of gangs formed for the sake of preying on society, and not doing so as a mere accident of their being already a gang. Just in the same way we may see children begin to tell lies because they see others profiting by so doing, and not from any more innocent cause.

Even in the case of a gang formed in this more reprehensible manner, we have still to recognise the significance of the fact that the gang instinct itself is perfectly natural.

The Club or Gang Instinct.

An investigation of the club or gang instinct among American boys has recently been made by Dr. Henry D. Sheldon (not the Rev. C. Sheldon of pulpit-fiction notoriety), and forms the occasion of a most suggestive paper by Dr. William B. Forbush in a recent number of *The Pedagogical Seminary*. The *questionnaire* was answered by 1,022 boys, whose ages ranged from ten to seventeen, and of these no less than 851 were members of some club or society. That is to say, nearly nine boys out of ten showed the active presence of the club instinct, and several of these were members of more than one society.

It is most important to note that all these societies were *formed by the boys themselves*, no account being taken of societies *formed for boys* by older people. We cannot give any particulars as to the surroundings of these boys—rural or city—nor as to their social circumstances, but the result brought out is certainly remarkable. Briefly it is this: apart from the societies organised by adults, eight boys out of every ten belong to some club or society of their own. The majority of these societies are described as athletic or game clubs—61 per cent.; next to these, it should be noticed, come clubs which are described—not by the boys themselves, presumably—as "predatory." These number 17 per cent., 105 such clubs being reported by the 1,022 boys. The title is startling, but it means only such forms of joint activity as hunting, and the like, which indicate the presence of predatory instincts, though not necessarily extending to breach of social order. Only 1 per cent. of the clubs was philanthropic.

So much for America. I wonder how *we* stand in this matter? It would be difficult to discover by the method employed by Dr. Sheldon. English society is less homogeneous and more distinctly stratified than American, and it would not be easy to secure answers to similar queries from a thousand boys who would be proportionally representative of English society. The whole of the so-called Public School stratum is *hors de concours*, as being placed in entirely artificial circumstances. The same may be said of the lowest stratum, giving a somewhat different meaning to the word "artificial." But there should still be available a very large scope for an *enquête* like that of Dr. Sheldon, and its results might have much significance, socially and educationally.

A Normal Phenomenon.

Even without such an inquiry, we should be safe in saying that the great majority of boys of twelve or fourteen manifest the club or gang instinct, just as naturally as they develop a few years later what we may call, looking to results, the family instinct. Now here is a point to be kept in view: no one thinks of blaming the home when the young man manifests tendencies towards establishing a new home of his own; similarly, no one should blame the home for the boy exhibiting the tendency to club with companions of his own age. This, of course, leaves untouched the questions of the kind of companions, and the objects pursued by the club; these will be determined by many factors, of which the character of the home is perhaps the largest. But in any case the instinct exists, and is not to be repressed, and not to be ignored; it should be guided, and made to fulfil its end in the development of the man that is to be.

So when any presumably well-meaning but certainly ill-informed gentleman declares that had he the power to carry out his plans he would abolish Hooliganism in a week, his ideas may be likened to those of a physician who would abolish scarlet fever by painting his patients white. And when other individuals, also possibly well-meaning, but no better informed, declare that Hooliganism is the result of

Board-school education, they are uttering a calumny which, even if it were well founded in fact, would still be rather less than half the truth. Even the London committee which recently examined into this question do not recognise, except by implication and in a negative aspect, the real significance of the phenomenon.

Its Growth and Significance.

We must recognise the existence of the club instinct as perfectly normal. At the Board-school age it does not exist, or exists only in embryo, as the boy's beard may be supposed to do. In school, therefore, it cannot be trained. The general moral training will, of course, tell on the direction in which the boy will exercise the instinct when it appears, but this is all we can expect from the elementary school. It is curious to watch the instinct in its earliest manifestations during the school life. The boys try to form teams for games, such as cricket, but there is little subordination and organisation. The least difference of opinion leads to a collapse of the team, to be resuscitated next day, probably, and to meet a similar fate the day after. By-and-by the feeling of solidarity and the need for companionship strengthen, and the team enjoys longer periods of calm, until at length it becomes an institution strong enough to bear victory and defeat alike without fatal consequences. But before this stage arrives probably the boys have left school.

The significance of the club instinct should not be overlooked. It is the first dawning of the tendency towards social and civic life, as distinguished from individual and family life. It is not within our scope here to insist on the consequent importance of giving such tendencies the fullest scope: this is obvious, even on the most casual view. If the unfortunate surroundings of the boys at home and in the streets lead to their combining for mischievous purposes, the danger to society is not merely Hooliganism, but the perversion of the social instinct into anti-social faction tendencies, the danger of which is not limited to the present annoyance and danger of peaceful citizens. Were it possible to suppress the gang instinct entirely, the obvious result would be to weaken the feeling of solidarity and social responsibility, and to render more difficult in after-life all combination and organisation for social and political ends. Stunted boyhood cannot blossom into complete manhood.

The Practical Problem.

How to develop and direct the club instinct is a wide problem. There are many agencies at work already—such as Boys' Brigades, gymnastic clubs, recreative evening classes, and the like. The central educational authorities evidently do not recognise any duty in the matter, and when the local authorities make an effort in the right direction, they are apt to find the law against them. A foreigner who studied education in England merely through codes and legislation on the subject would be apt to conclude that our chief fault in England is a desire to keep our children too long at school, seeing that there are such stringent rules against attendance beyond a certain age.

But, after all, any form of association *for boys* which is conducted by adults is only a partial solution of the problem. What is needed is the facility for boys forming their own associations, only under the benevolent and unobtrusive watchfulness of their elders. Help may be given, and dangers may be avoided, but here, as everywhere, it is what the boy himself does that really develops him. It may be hard or impossible to find such facilities in cities, and this is only one of many aspects in which city life shows itself inimical to the best development of the race. Yet much could be done, and would be done, perhaps, if we once came to recognise the existence of such a thing as the club instinct as a part of human nature. And, to end on the keynote, this is just where Child-Study comes in. Its business is to explore the nature of the developing human being, in order that all its natural wants may be recognised and provided for. Hence the Hooligan in this column. J. G.

Next Month:

OBJECT LESSONS IN HISTORY.

Illustrated.

THE CERTIFICATE SYLLABUS, 1902.

THE Syllabus for 1902 is now published, with the exception of the part for first year candidates. The course in needlework has been considerably altered, methods of teaching being put into greater prominence. The second part of the Syllabus, for both men and women, consists of six groups:—

A. English Language and Literature.
B. Geography and History.
C. Two of the following:—(1) Arithmetic *or* (2) Algebra; (3) Geometry; (4) Domestic Economy.
D. Two Languages.
E. Two subjects of Science.
F. Two of the following:—(1) one Language; (2) one subject of Science; (3) Political Economy.

A and C are compulsory, and all candidates must also take one, and only one, of the other groups.

For men, Group C includes:—(1) Algebra and Trigonometry, and (2) Geometry.

The general range of the subjects has scarcely been altered, except in Group C, where the geometry for women now includes the *Third* Book of Euclid, and trigonometry has been introduced for men.

German Association for Manual Instruction.—An Illustrated Prospectus of the Teachers' Training College in connection with this association has just been issued by Dr. Pabst of Leipzig. It gives full particulars of the summer courses to be held during the month of August. The courses of instruction deal with CARDBOARD WORK, JOINERS' WORK, WOOD CARVING, MODELLING, METAL WORK, etc., etc. A copy of this prospectus, and any further information regarding the courses, can be obtained upon application to J. Grigor, Esq., 17 Battlefield Gardens, Langside, Glasgow.

"The Scholars' Annual."—The International Annual in connection with the subject of international correspondence is promised at Easter. In our January number we gave an outline of Mr. Stead's scheme, which, doubtless, will have interested a large number of our readers. At the time of going to press, we understand that a number of names have been sent in as candidates for the promised prizes, and that a few sketches from pupils have been received. Teachers who have not yet sent in their names are asked to do so at once, as the list of prize-winners, with name of teacher and school address, must be ready for publication by the end of February at latest. Mr. Stead would also be glad to have every teacher's list of "scholars in correspondence" who wish to have the Annual. It will be sent free. The cost of postage (2½d. each book) must be forwarded, of course. The reason for having lists early is that the size of edition will be determined by the early demands. France and Germany have already asked for 4,000 copies.

For further particulars, apply *Review of Reviews* Office, Mowbray House, Norfolk Street, Strand, endorsed "Languages."

Sloyd Association of Great Britain and Ireland.—Sloyd Courses will be held at Nääs, as follows:—

Course 92 from 12th June to 24th July.
,, 93 ,, 31st July ,, 10th Sept.
,, 94 ,, 6th Nov. ,, 17th Dec.

Holiday Courses will also be held at Ambleside, Aberystwyth, and Penarth during August.

Full particulars of these Courses, together with form of application for Nääs, will be supplied by the secretary, Mr. John Cooke, 131 Percy Road, Shepherd's Bush, W., on receipt of stamped, addressed envelope. Applications for Nääs should be received by the secretary not later than 31st March next.

Prize Competition (New Designs).—Messrs. Chapman and Hall offer one prize of £1, one of 10s., and fourteen prizes of 5s. each, and a certificate for every prize-winner, for the best original design, in water colour or oils, illustrating any incident in any one of the reading books included in "The Young People's Library," subject to the following conditions:—

The paintings must be the unaided work of students (male or female) in some recognised public school or institute.

The name of the student must be on the roll of such school or institute when the painting is sent in.

Students must not be more than eighteen years of age when the paintings are sent in.

Every painting must have a certificate attached to it in the form to be obtained, with full particulars, from Messrs. Chapman and Hall, Publishers, Henrietta Street, Covent Garden.

Our Monthly Retrospect

NATIONAL UNION OF TEACHERS.

ELECTION OF VICE-PRESIDENT.

CONTRARY to general expectation, the contest this year is to be narrowed down to three candidates; Messrs. John, Jones, and Peaker not making the anticipated appearance, and Dr. Beach retiring from the contest owing to illness. Members of the Union will be sorry to hear that the worthy doctor has for the same reason given up all thought of returning to Russell Square as a member of the Executive—a decision which will undoubtedly be received with regret in Union circles all over the country; for his ability, devotion to the work, and enthusiasm in the cause have long been recognised, and pointed the way, sooner or later, to "the Chair."

The fight on this occasion lies between representatives of the class teachers, large town schools, and rural schools, so that, in spite of the smaller number of candidates than usual, there will be no lack of interest in the contest. Messrs. Coward and Croft have already made the acquaintance of the vice-president voters. Mr. Muscott makes his bow for the first time in this capacity; yet he is not new to Union contests, for he secured a seat upon the Executive in 1890, taking the twenty-first place, and polling 3,162 votes. (It is interesting to note that of the twenty-four then elected *only four* are to be found on the present Executive—namely, Messrs. Rankilor, Ellery, Macnamara, and John.)

The following gives the results of the elections so far as the present candidates are concerned:—

1890. Mr. Muscott, 21st place, 3,162 votes.
1891. ,, ,, 20th ,, 4,037 ,,
1892. ,, ,, 19th ,, 4,730 ,,
1893. ,, ,, 19th ,, 5,532 ,,
1894. ,, ,, 23rd ,, 5,923 ,,
1895. Mr. Croft, No. 14, 6,667 votes; Mr. Muscott, No. 20, 5,523 votes; Mr. Coward, No. 27 (unsuccessful) 5,172 votes.
1896. Mr. Croft, No. 6, 10,157 votes; Mr. Muscott, No. 18, 7,409 votes; Mr. Coward, No. 23, 6,522 votes.
1897. Mr. Croft, No. 5, 11,183 votes; Mr. Coward, No. 18, 8,578 votes; Mr. Muscott, No. 23, 7,733 votes.

ELECTORAL DISTRICTS.

1898. *North Midland.*—Mr. Croft, 1st, 1,601 votes.
South Midland.—Mr. Muscott, 5th, 709 votes (unsuccessful).
West England.—Mr. Coward, 1st, 1,161 votes.
1899. *North Midland.*—Mr. Croft, 1st, 1,507 votes.
South Midland.—Mr. Muscott, 4th, 751 votes (unsuccessful).
West England.—Messrs. Coward, Butland, and Gregory (no contest).
1900. *North Midland.*—Mr. Croft, 1st, 1,447 votes.
South Midland.—Mr. Muscott, 6th, 727 votes (unsuccessful).
West England.—Mr. Coward, 1st, 1,757 votes.

VICE-PRESIDENCY.

1900. Mr. Blacker, 1st, 13,711 votes (successful).
Mr. Croft, 2nd, 7,501 votes (unsuccessful).
Mr. Tom John, 3rd, 4,833 votes ,,
Mr. Coward, 4th, 2,620 votes ,,

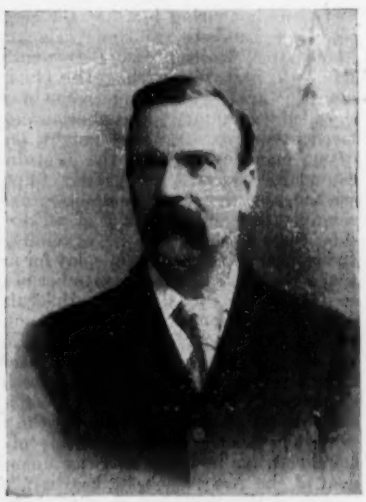
With this introduction we pass to the Union record of the candidates, and then leave our readers to exercise the vote entrusted to them.

In the past there has been much apathy, for which there has been no really good excuse. Let us hope for better things this year, and may the best man win!

MR. HARRY COWARD

has an ambitious programme, which, no doubt, will be closely scanned by those who hold that candidates for N.U.T. honours should have a clearly-defined policy. This is what he places in the forefront: A national system of education, an active campaign on the tenure and attendance questions, amendment of the present inadequate Superannuation Act as speedily as possible, the removal of the disabilities of certificated class teachers, more generous treatment of rural and small schools, equal pay and status for girls' and infants' mistresses, the maintenance of the teacher's right to control the internal organisation of the school, greater attention to the organisation and control of the N.U.T. Orphan and Benevolent Fund.

He is unquestionably indefatigable, and is one of the hardest working members of the Executive, his record of attendances, and his close application to the details of the work, entitling him to the highest praise. We said last year, "His ability, his zeal, his perseverance, and his enthusiasm eminently qualify him for the high office he seeks to fill. The Union has no more faithful servant than Mr. Harry Coward of Bristol." Nothing has happened since then to lead us to modify our opinion. On the contrary, if it were possible to give him a higher character, his work during 1900 would compel us to award it. He has addressed large meetings at Plymouth, Taunton, Aberdare, Selby, etc.; he has spoken words of counsel to the students in the Bristol Day College, Fishponds College, and the Borough Road College; he accompanied the vice-president of the Union to the Belgium Congress; has rendered excellent service on the Council of the Benevolent and Orphan Fund (in this connection, it may be mentioned, he has raised about £250, collected from friends, not teachers), conducted important inquiries on behalf of the Union, and found time to act as vice-chairman of the Superannuation Committee. It is said of him, indeed, that he spent only one Saturday at home during 1900!



MR. HARRY COWARD.

That his work is appreciated is seen from the fact that he has received one hundred and twenty-one nominations (including Bristol, Liverpool, East London, Oxford, Plymouth, Southwark, and Westminster), and that in his own division—West England (six counties)—he is the only candidate who has been nominated for the vice-presidency.

He has been a member of the Union for twenty-four years, and a member of the committee of the Bristol Association for seventeen years. For four years he filled the office of treasurer, and twice he was unanimously elected to the chair of the local branch to which he belongs. In addition to all

this, he has taken an active part in political and other work for many years past.

We have only to add that Mr. Coward's claims are strong, and that whenever the Union sees fit to place him in the chair, he will prove himself a worthy successor to the many good men who have preceded him.

MR. ALLEN CROFT.

MR. ALLEN CROFT

was, as we have seen, the second on the poll at Easter 1900, and his friends are confident he will take the first place on this occasion. He has been nominated by 104 associations, the total voting strength of which is 21,000.

Among the associations honouring him are Birmingham, Bradford, Chelsea, East Lambeth, Finsbury, Hackney, Leeds, Leicester, Manchester, Nottingham, Portsmouth, St. Pancras, West Lambeth, and Woolwich. The chief points in his "programme" are:—A national system of education with—(*a*) no so-called "voluntary" contributions, (*b*) no harassing interference with teachers and taught, (*c*) no barrack schools, (*d*) no mammoth classes; the co-ordination of primary and secondary education, a greatly improved superannuation scheme, abolition of all compulsory extraneous tasks, better remuneration and conditions of service for rural and certificated class teachers, security of tenure, complete freedom for the teacher in the school, fairplay for mistresses. For twenty years Mr. Croft has been a member of the N.U.T., a member of the Executive for six years, vice-chairman of the Education Committee for four years, and a strenuous local worker for both Union and Benevolent and Orphan Fund for sixteen years. He was the first president of the National Federation of Assistant Teachers, in which capacity he rendered signal service to his fellows, and has in many other ways done useful work not only for class teachers but for the profession generally.

That he has the confidence of his colleagues in Nottingham is evident, for he has been twice unanimously elected president of the Association, he has been chairman of the local branch of the Provident Society since its inception, and has served on the general and benevolent committees for over sixteen years. At Russell Square he has proved himself an able lieutenant to Mr. Robert Wild in the Education Committee; but that is not all, for he has taken a keen interest in all the other branches of the work with which he has been connected. He is a clever speaker, a man of dignified bearing and of culture. He enjoys the confidence of his colleagues on the Executive, who have frequently entrusted him with responsible and delicate duties, and, above all, he is a man of honesty and "grit." Ireland, Scotland, and Holland have been visited by him as the chosen representative of the Union, the wisdom of the appointment being seen in the fact that he has been asked by the teachers in those countries to visit them again. In the past year he has addressed more meetings, travelled more miles, and spent more time on Union business than in any previous year.

The Union will honour itself by honouring Mr. Allen Croft, and there is no reason to fear it will ever regret conferring upon him so great a distinction.

MR. W. MUSCOTT

is a non-collegiate teacher, and the rural teacher candidate for the vice-presidency. As we have already shown, he is by no means new to Executive work, for under the old system of election he was successful from 1890 to 1897. Under the Electoral Districts Scheme, however, he has failed to find a place for the South Midlands. He began his teaching career at St. Matthew's Boys' School, Leicester, nearly thirty years ago, after leaving which he taught in Peover Mixed School, Cheshire; Sileby Mixed School, near Leicester; and then at Garsington Mixed School, Oxford, where he has laboured for the past twenty-three years. One of his earliest Union efforts was the formation of the Oxford Association, which in 1894 was able to entertain the Conference, and to carry out all the details of the work to the complete satisfaction of the vast army of representatives. Mr. Muscott, being in daily contact with the difficulties of rural schools—insufficient staff, extraneous duties, and payment by results—soon began an agitation for remedial measures. In 1886 he gave evidence before the Royal Commission on Education, and continuing the agitation publicly, and amongst members of the Union, he piloted, with Messrs. Graves and Ellery, a rural teachers' deputation to the Education Department. The National Federation of Rural Teachers received his heartiest support, and he became its president. During his year of office he again secured the reception of a deputation of rural teachers at the Education Department, on which occasion he strongly protested to Sir John Gorst against the compulsory teaching of agriculture. His educational "platform" is as follows:—National and rate aid, thus placing all schools under the same financial conditions; all schools to be publicly controlled by the County and Borough Councils, thus sweeping away one-man management, bad management of small School Boards, and non-salaried extraneous duties; religious instruction as at present—that is, in accordance with the views of the religious body providing the buildings; graded salaries and grouped schools in rural districts; efficient education, to be secured by the Board of Education through H.M. Inspectors. It is being urged by some of Mr. Muscott's friends that of the thirty-two vice-presidents of the N.U.T. only one of them—Mr. J. J. Graves—has been a rural teacher, and that it goes without saying that one wearing the shoe of rural difficulties would be able to speak first hand and with force. The whole of this statement is scarcely correct, for many of the thirty-two had considerable experience in rural schools in the early days of their teaching career, and could speak, and as a matter of fact did speak very effectively, out of the fullness of knowledge, on rural school matters.

MR. W. MUSCOTT.

Mr. Muscott, of course, recognises that his chances of success on the present occasion are very small indeed; but perhaps it is just as well that the interest of the rural teachers should be awakened. From this point of view, therefore, if from no other, Mr. Muscott is probably rendering the Union a distinct service in seeking the suffrages of its members.

TECHNICAL AND SECONDARY EDUCATION.

The London School Board and the Cockerton Judgment.

It was absolutely necessary, in face of the Cockerton judgment, that some steps should be taken to test the correctness of the interpretation put upon the acts of the London School Board by Justices Wills and Kennedy. Had no action been taken, the whole of the expenditure on adult education, and on the work of the evening schools which goes on outside the Evening School Code, would have

had to be suspended, or the members of the Board would have become liable, individually, for any cheques signed by them in payment for this work. Consequently, notwithstanding the protests of a minority of the Moderate members of the Board, an appeal has been entered. There is complete unanimity among the School Boards as to the necessity for the action of the London Board, and the Executive of the Association of School Boards met a short time ago to consider the question fully, with a view to safeguarding the work which under them has proved so great a success.

County Council Scholarships. Definite information has been given in a blue-book published by the Board of Education concerning the County Council scholarships granted during the past three years. Junior County Council scholarships are given generally for the purpose of enabling children of poor parents to proceed from elementary to secondary schools, but in certain cases children in secondary schools are allowed to compete, while in others a proportion of the scholarships is set aside for the purpose.

In the three years, 4,673 children, of whom 4,231 were in elementary schools, gained junior scholarships. These came from Board and Voluntary schools in the following proportions—2,673 and 1,538 respectively. The scholarships, as a rule, include free tuition and an allowance for travelling, maintenance, and books.

Of the 519 winners of intermediate scholarships, 307 had previously held junior scholarships. The constituency from which the candidates could be drawn is much wider than in the case of the junior scholarships.

The miscellaneous scholarships, 1,050 in number, are variously designated, and include 360 major scholarships, 188 agricultural, 190 art, 150 mining, 31 domestic economy, 18 nursing, 9 music, 15 commercial, 3 wood-carving, 3 nautical, and 40 training college. The scholarships vary in value, but are generally greater in amount than junior and intermediate. The various scholarships were gained by all classes of the industrial community—234 junior and 11 intermediate being obtained by children of labourers, 204 and 18 by children of those employed in domestic service, and 256 and 41 by those of widows and persons without occupation.

Twenty-five obtained scholarships at Cambridge University, and five at Oxford. The children of a journeyman bootmaker, a tailor, a cabinet-maker, a fruiterer, and an innkeeper were represented in this latter list.

The facts of interest in connection with this return are the smallness of the number of scholarships compared with the children in elementary schools—only about one scholarship in three years for a thousand children in average attendance—and the paucity of the numbers compared with those whose parents are anxious that they should obtain further education as shown by the attendance at higher-grade schools and schools of science. The amount of money granted in scholarships also bears only a low ratio to the money the County Councils have to spend.

France and Secondary Education. It is the common practice to decry our own educational condition and prospects in order to arouse the interest of the people in educational advancement. It is somewhat remarkable, however, that either from ignorance, or from a similar reason to our own, the authorities in France find it advisable to praise the educational systems of other countries, including our own. Thus in the course of the discussion in the Senate of France on January 17, on the subject of Secondary Education (says a Paris correspondent), M. Leygues, Minister of Public Instruction, paid a high compliment to the educational system of Great Britain, saying that the youths of England were admirably equipped for earning their living. One reason was that the English boy of sixteen had practically finished his education, was engaged in business, and had seen other countries than his own. In France, at that age, the college student did not know his own native village, and the most useful years of youth were condemned to idleness. Whatever defects there may be, therefore, in our system, it has obtained the admiration of the most important educational authority of one of our rivals in commerce at the present time. While seeking to effect proper organisation and reforms, therefore, it will be well to remember that things in England, at least to foreign eyes, are not so bad as they are painted.

Educational Value of Exhibitions. The provincial towns of England are fully alive to the value attaching to the exhibition of educational activities of other countries. Thus the Manchester Corporation, whose fine technical school is approaching completion, anxious that its citizens should have an object lesson in the necessity for increased attention to technical instruction, has secured the admirable collection of apparatus, complete in all its stages and details, furnished by the United States to the Paris Exhibition. The States are, of course, the great rivals of Lancashire in the manufacture of cotton and other fabrics, and the work of the Technical Committee and the endorsement of the public of its action are in marked contrast to that exhibited in the metropolis. The various departments of secondary education—general, industrial, commercial—of trade schools, professional schools, colleges, and universities, are attracting considerable attention, and a renewed impetus will be given to the labours of the Technical Committees of Manchester and of the Lancashire County Council when comparisons are made with what can be done in the north-west of England.

A large section of the great exhibition to be held in Glasgow during this year is to be devoted to education of various grades. Nothing has shown the great necessity for correlation in England so plainly, or the necessity for all grades being under one and the same local authority, as the comparison with other countries instituted in the exhibitions of educational appliances recently held.

NOTES FROM THE NORTH.

The Merit Certificate. The subject of the Merit Certificate, or rather of the examinations for the Merit Certificate, has, during the last few months, been receiving considerable attention on the part of teachers throughout Scotland. From all parts complaints are being heard of the diversities of the examinations, and from the recent Bluebook it will be seen that the results vary from 50 per cent. in one district to over 90 in another; yea, in the same district, inspectors have so varied their examinations that percentages ranging between these two figures have even been found, although the result could not be attributed to any difference in the teaching. Allowing that the diversity of these passes may be partly explained by the fact that some teachers have put forward all the pupils formerly presented in the Sixth Standard, while others have only selected a few of the best, there is still a considerable margin left unaccounted for.

In order to obviate this unsatisfactory condition of affairs, it is proposed that there should be a uniformity of standard, and that the examination should be held on the same day throughout Scotland, and that the questions should be sent from headquarters, as in the case of the Leaving Certificates: if uniformity is possible in the latter case, it is held that the difficulties in the former case are by no means insuperable. In Circular 223 there are given the broad lines on which the examination is to be conducted, but these are being interpreted very differently in various localities. From the questions set in English and Arithmetic which have been sent to us from different districts, the reason of the varying results is not far to seek. In support of this proposal, it is maintained that the Merit Certificate would then be more satisfactory as an estimate of national work, and as a pass to the higher departments of the schools.

Circular 223 lays the Merit Certificate down as the natural goal of *every* pupil in an elementary school; but if only 50 per cent. of the children admitted to the examination in some places are found proficient in the fundamental subjects of the examination, either the standard is too high or the instruction given in our schools is not of a very high character. We incline to the former explanation. The Department also points out that an elementary education whose culminating point falls below the standard of the Merit Certificate is incomplete and imperfect; the conclusion, there-

fore, must be that such is the condition of education in a large proportion of Scottish schools.

The Merit Certificate as a Leaving Certificate. As a *leaving* certificate teachers will not be likely to consider the examination too high, for it appears to be the intention of the Department to keep children longer at school, and, instead of boldly saying that no child should leave school until the age of fourteen, it has practically done so by the introduction of this certificate. It appears to us that pupils who have been a year in the Sixth Standard are not fully qualified to obtain the certificate. This examination, with the very rare exceptions of the Labour Examination Certificate, makes this certificate in effect the leaving certificate of the elementary school proper. But there is a danger here which must be guarded against. In making the requirements too high, parents will in larger numbers take advantage of the less difficult path, the line of less resistance—namely, the Labour Certificate. This would be a great cause for regret. The happy medium is what is wanted.

The Merit Certificate as an Honours Certificate. Not only, however, is this certificate the leaving certificate of the elementary school, but it is also the passport to the higher departments, "a proof of the child's capacity to profit by higher forms of education," and marks "in a fairly definite way the dividing line between primary and secondary education," and is regarded "as in some sense an honours and not a pass certificate." Now it is this double-barrelled application that is causing the outcry at the present time. The standard being so high in some parts, makes the examination a prohibitive rather than a pass one, with the result that the number of pupils in the higher departments has been curtailed. Another danger that threatens is, that in some places the children are being prematurely forced to enter for the examination so as to fill these higher departments to which large grants are attached. So that, added to repression, there is also oppression, and many children at a little over twelve years of age are pushed forward, and, what is the worst feature of the case, very often leave school immediately on obtaining the certificate.

Suggestion as to Merit Certificates. If pupils are to continue for two or three years longer at school, the standard is too high; if, however, they intend leaving school immediately on their receiving the certificate, the standard may not be considered too high. How these two positions are to be reconciled in one examination is the problem for the Department. Could a lower examination not be introduced as the entrance to the higher departments, and the present standard retained with regard to the exit from school, it being understood that no child is to be presented until he has passed through the Sixth Standard? In both cases let it be a uniform one.

One paragraph of Circular 223 says "that pupils who obtain the Merit Certificate, or who, while failing to obtain it, nevertheless in the judgment of the inspector show such attainment as satisfies the requirements for the Labour Certificate, will be exempted from further examination for the Labour Certificate." Now might not such a qualifying condition as "who, while failing to obtain it, nevertheless in the judgment of the inspector show their capacity to profit by the higher forms of education," be introduced, for the sake of the advancement of pupils to the higher departments, and be considered as a passport to these schools, first and second classes if necessary?

Leaving Certificate. By Circular 308, the Department again express their intention of giving an opportunity to scholars who have received instruction in science in recognised schools, according to a curriculum extending over at least three years, and providing in every case for experimental work on the part of the pupils, to obtain a leaving certificate testifying to the satisfactory conclusion of an approved course of instruction in the subject.

Instead of one paper being set for all candidates, the examination is to be chiefly oral and practical, and in each school is to be based upon the curriculum of the school and upon the profession made of the work done, provided that the former is satisfactory and the latter adequate. The standard is to be high, and as far as possible uniform.

Circular 310 directs attention to a point regarding which there appears to be some possibility of misapprehension.

The papers for the Honours Grade Certificate in Latin and Greek are to be entirely distinct this year from the Higher Grade. The Department, however, do not propose at present to discontinue the practice hitherto adopted of issuing Higher-Grade Certificates to those unsuccessful candidates for Honours whose work bears witness to a level of attainment corresponding to that for a Higher-Grade Certificate on the Higher-Grade Paper.

Increased Superannuation Premiums. The Scotch Education Department, by a letter dated February 11, have intimated that the contributions of Scottish men teachers will, from and after April 1, 1901, be at the rate of three pounds five shillings a year. This is due to the fact that the average salary of certificated men teachers exceeds that of 1892—namely, £119, 13s. 3d.—by more than 10 per cent., being, for the year 1899–1900, £142, 15s. 10d. The contributions to be paid by Scottish women teachers remain unchanged.

Commercial Education. A deputation from the Edinburgh and Leith Chambers of Commerce had an interview with Lord Balfour of Burleigh, the Secretary for Scotland, on the subject of commercial education. The deputationists, in their report, practically gave the conclusions contained in the report on this subject recently referred to in THE PRACTICAL TEACHER.

Lord Balfour, in his reply, took up the most important of these points, and dealt with them pretty fully. With reference to the conclusion that the teaching in the elementary schools was defective, the Secretary for Scotland, without any reflection on the Scotch Education Department, said he might admit that to some extent it was perhaps not quite so good as it might be. But to what, he would ask, was that circumstance due? Was it to be attributed to the arrangement which existed in their schools? It had been stated that it was due to the "too great diversity of subjects." Lord Balfour thought that the introduction of the Merit Certificate had done a good deal to amend that by confining it to proficiency in elementary subjects.

He disagreed with the report in suggesting that elementary education, up to twelve years of age, should be confined to elementary subjects. He thought there should be grounding, for example, in those very modern languages which they most desired to see the teaching of made better and perfected. He believed the elimination of the higher subjects would have a bad effect alike on teachers and pupils, for he was of opinion that many a child could have its intellect stimulated by the reasonable and proper introduction of such subjects.

He was at one with the deputation, however, in desiring to see elementary education as sound and as thorough as possible. He wished that they as employers, and as representatives of employers, would ask boys and girls to produce the Merit Certificate before taking them into employment This he strongly impressed upon them, as he thought that by such means it would get into the minds of parents and children that the Merit Certificate was of real value and a passport into employment, and that in the course of time this would have a much more powerful effect than the efforts of the compulsory officers in securing regular attendance at school.

With regard to the school-leaving age he spoke very strongly, and pointed out that some of the evidence put a premium on boys of fourteen or fifteen. By so doing they could not expect to get a completely educated man—no school system could do it; and, as commercial men, they must therefore make up their minds whether they would have the children at fourteen or fifteen, or wait till they were sixteen or seventeen, or even a year or two older. All his instinct and belief was in this direction, that the boy left at school till sixteen or seventeen, or even eighteen, although he might not go into business as competent, would in years after prove a much more satisfactory servant; because he would have been better taught, and would be able more readily to fit himself for his new situation.

Lord Balfour did not agree with the suggestion that modern languages should receive the same weight in their examina-

tion as classics, inasmuch as the former took much less time to be acquired. He then referred at some length to the better teaching of modern languages, and desired to see greater facilities given for their teaching.

He did not think that commerce should be taught in schools. They should do all they could to fit people for commercial life, but that was all they should be asked to do, and all they could do. The real, crucial question they had to consider was, how far the defects, which to a certain extent he admitted, were really due to lack of opportunities, and how far they were due to the inadequate use made of the opportunities now existing. If these defects were due to the latter cause, the only means of working out the remedy was by bringing about a change in public opinion.

PRIMARY EDUCATION IN HOLLAND,

AND ITS LATEST DEVELOPMENT.

BY W. T. THOMPSON, B.A.

HOLLAND has commenced the new century well. On January 1, 1901, attendance at school became compulsory in that country. In two important respects, however, the problem to be solved by educational authorities in Holland differs from that which confronted our own authorities in 1870. So far back as 1801 a law was passed enjoining that in each parish sufficient schools should be established to provide a place for every child resident within its limits, and school inspectors were appointed for the whole kingdom. Not only is there no lack of school buildings in Holland, but the proportion of children who grow up without instruction is very much less than was the case with us thirty years ago. For some years the law has made it to the interest of the poorest classes in Holland to see that their children attend school. By the law of 1878 it was laid down that no assistance, excepting medical assistance, should be given from communal funds to persons in need, unless either their children attended school, or they could prove that they had done their best to cause them to attend school. From the latest returns we have been able to get hold of, the percentage of children between the ages of six and twelve who were not on the books of any school at the time the return was made up was 9·03. There is, however, not nearly as much illiteracy in Holland as these figures would suggest. The greatest obstacle to primary education in Holland has been rather bad attendance than non-attendance, and it is this difficulty which the new law is primarily intended to cope with. Before commenting on the salient provisions of the new enactment, some remarks on primary education in a country inhabited by a race so closely akin to our own may not be uninteresting to our readers.

The organisation of primary education in Holland preceded that of England by many years. In the fundamental ideas which governed this organisation may be traced the influences of the national character, of the geographical position of the country, and of the circumstances of the time when it was effected. Proximity to Germany led to the early organisation of primary education on systematic lines; whilst the hereditary attachment of the people to personal and religious liberty, the influence of the ideas which gave birth to the French Revolution, and the close sympathy and union with France led to the establishment of the "neutral" or undenominational school, and to the prohibition of the teaching of any particular creed therein.

Religious Teaching.

Not only were the *bijzondere*, or voluntary schools, unrecognised at first, but they were altogether shut out from participation in public funds. The law of 1806, while forbidding dogmatic teaching in public schools, ordered that the scholars should be taught the practice of all Christian and social virtues; but it would be a mistake to suppose from this that religious instruction was given with anything like the fullness and thoroughness of that we are accustomed to in our Board schools. To a somewhat large extent, the attitude of the public schools towards religious dogma was aggressive and unconciliatory, and there was some ground for the complaint that they fostered indifference to religion and were nurseries of revolutionary ideas. The meagreness of the religious teaching in the majority of the public schools may be inferred from the fact that when a parish in 1838 bought ninety Bibles for its school, the governor of the province, struck by this notable display of zeal in the interests of religious education, sent round a circular to all the parishes in his government commending the example given to their imitation. To Catholics, and to many Protestants, the public schools became unacceptable, by reason not only of the colourless character of the religious instruction given, but of the increasing neglect of such instruction; and the establishment of voluntary schools went on apace. At first such schools could only be established with the consent of the communal authorities, and the entire expenses of maintaining them were thrown upon their supporters. But permission to exist did not long satisfy the supporters of denominational schools.

State Aid.

The cry for State aid became ever louder and stronger. From time to time motions were made in Parliament to this effect, but only to be rejected. The persistence of the supporters of the *bijzondere* schools, and their growing power, led the opposite party in 1857 to make them the concession of allowing the use of the *openbare*, or Board schools, for giving denominational instruction out of school hours. On the question of State subsidies the opposition was as uncompromising as ever. But this concession did not satisfy the denominationalists. Year by year more and more money was spent on the public schools, and they were becoming more efficient. Moreover, instruction in the public schools had now become gratuitous. The severity of the competition was thus largely increased for the *bijzondere* schools, and the efforts of their supporters to obtain State aid became more determined still. Religious teaching, even of an undenominational character, had now disappeared from the programme of the public schools, and moderate men began to fear the evil results which would follow an education divorced from religion. When the results of the law of 1857 became apparent, the parliamentary struggle became fiercer than ever. For nearly thirty years the question of granting subsidies to voluntary schools was one of the burning questions of internal politics in Holland. It caused the fall of several ministries, and it was not settled until 1889, when the Mackay Ministry came into power, pledged to end the strife of more than half a century. The Catholics, anti-revolutionaries, and an important section of Liberals combined to carry a Bill the most important features of which consisted of a reimposition of fees in public schools—provision being made for cases of inability to pay them—and the granting of subsidies to the *bijzondere* schools. These could henceforth enjoy the same subsidies as the *openbare* schools, on condition that the teaching staff was as ample as in the latter, and that at least eighteen hours per week were given to secular instruction. The nomination of the teachers, the choice of school books, and the drawing up of courses of study were left in the power of the managers of these schools. To enable the voluntary schools gradually to conform to the State requirements as to the provision of staff, the full operation of the section of the law dealing with this matter was suspended until the end of 1898. The religious strife thus ended, the question of the efficiency of the instruction given in the schools began to be debated, and there was a consensus of opinion that unless attendance were made compulsory, the full effects of the efforts made could not be realised. Objections to compulsion were not wanting, and in the national character there is an innate objection to it. It was felt, however, that it was unavoidable, and, after suffering many modifications, the new law received the Queen's signature on July 7, 1900.

The Law of 1900

is divided into two parts, the first of which deals with ordinary elementary instruction, and the second with con-

tinuation schools. It is only in the ordinary schools that compulsion is introduced. All parents and guardians must send their children to a public or voluntary school, or provide instruction at home for them. In the latter case the parent is bound to present the child once a year to the inspector of schools, who may examine him. If he finds that his progress is not satisfactory, he may require the parent to make better arrangements for his child's instruction. If this is not done within three months, the parent is liable to the same penalties as if his child did not attend school. The inspector must also be furnished with the name of the person giving instruction, and the times during which instruction is given; and he may claim to be present while the teaching is going on. Those who stay longer in a parish than twenty-eight days, whether in house, vessel, or conveyance, are considered as having a fixed residence in that parish; and the attendance of their children at school comes under the authority of the school attendance committee of the parish. The "distance limit" fixed by the Act is four kilometres—a distance somewhat in excess of that fixed by our own law. Temporary lack of room in every school within this radius is a valid excuse for non-attendance. A curious provision of the law enables a parent to refuse to send his child to school on the ground that he has a decided objection to the teaching of every school within a radius of four kilometres from his residence. This objection must be sent in writing to the burgomaster of the commune, who forwards it to the district school inspector. The latter approves it, unless he has ground for doubting the genuineness of the objection. A parent whose objections pass the two authorities mentioned is bound to provide home instruction for his child.

Six Years' Compulsory Instruction.

Compulsion commences at seven years of age, and ends when the child has been six years a pupil of a lower school, and has passed through all the classes of that school. If the whole course of the instruction given in the school presupposes a longer period than six years, the child is exempt when it has gone through the number of classes corresponding with six years' instruction. In this case the child is not exempt until it has reached the age of twelve years, and has completed the course of instruction in the class in which it found itself at that age. In every case a child is exempt when it has passed through the class in which it was working when it completed its thirteenth year. In the case of a child taught at home, it is exempt at twelve years of age if it has received six years' continuous instruction from the age of six, or at thirteen if the instruction has not commenced till the child was seven years of age.

Attendance.

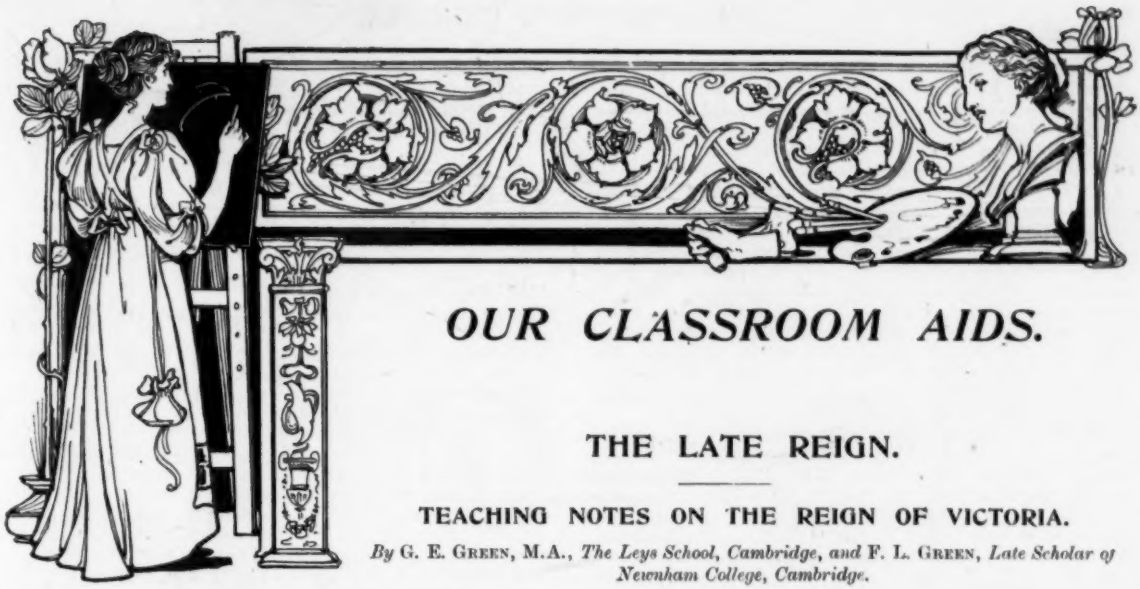
On the point of regularity of attendance the Dutch law is more definite than our own. What constitutes irregularity is strictly defined, and is not subject to the fantastic interpretations we know so much about. The "reasonable excuses" which may be accepted are set out in detail, and are subject to the approval of the head teacher and the district school inspector; whilst the method of dealing with parents and children who do not comply with the law is strictly laid down. More than two absences without accepted reasons, and occurring in two consecutive months, constitute irregularity. Reasonable excuses comprise absence on account of temporary closing of the school or suspension of instruction, closing of the school by medical authority, temporary suspension of attendance of individual children as a disciplinary measure, temporary leave granted by inspector of schools to enable children to be employed in rural occupations, indisposition of children, fulfilment of religious duties and observances, and other causes of a very urgent nature. Before we explain the method of dealing with irregular attenders and non-attenders, our rural readers will be interested to know how school attendance and field employments are reconciled in Holland. The communal council, acting in conjunction with the school inspector for the department, is authorised to fix a certain time or times during which temporary leave may be granted to children for the purpose of being employed in the fields. During these times, which may vary for different parts of the district, leave can be granted once a year for not more than six weeks to the children over ten years who during the preceding six months have attended school regularly. This leave may be refused if there is reason to think it will not be used for the purposes indicated by the law. In the administration of the law of compulsory attendance three authorities take part—the school inspector for the department (*arrondissements-schoolopziener*), the school attendance committee, and the district judge (*kantonrechter*). The school attendance committee consists of not more than nine persons, named by the communal council for not more than three years, and eligible for re-election at the end of their period of service. It contains representatives of the parents of the children, of the older teachers in the public schools, of the older teachers in the voluntary schools, and of the older inhabitants of the district. In a case of irregular attendance the school inspector for the department sends a written warning to the parent. If the offence is repeated within six months, he reports it to the school attendance committee, who must, within eight days, summon the parent to appear before them. The committee remind him of his duty, either orally or, in case of non-attendance, by letter. If a further offence is committed within six months of this warning, he is informed by letter that the committee has now done with his case, and that any further offence will be made the subject of legal proceedings. If the case comes before the *kantonrechter*, that official may inflict a fine of not more than 15 gulden (a gulden is worth about 1s. 8d.) for a first offence. If a second offence is committed within a year of the first conviction, or a third offence within a year of the second conviction, the maximum fine is the same. For a fourth offence, committed within six months of the third conviction, the maximum fine may go as high as 50 gulden. For subsequent breaches of the law, instead of a fine, imprisonment for not more than seven days may be inflicted. In the case of a child who does not attend school at all, much the same procedure is followed up to the point of the warning given by the school attendance committee. If the child is then not found to be attending school, his name is placed, by order of the inspector, on the roll of some public school, regard being had to the parent's wish in this respect, should he manifest any. At the same time the final warning is sent to the parent, who, if the need arises, is dealt with in the same way as the parent of an irregular attender.

Two provisions of the new law call for particular remark. The communal councils are empowered to make regulations authorising the police to detain children they may find in the streets during the hours of instruction, and conduct them to the presence of the head teacher of the school to which they belong. They have also authority to provide for needy children, whether on the books of public or voluntary schools, food and clothing, so as to enable them to attend school regularly.

Continuation Schools.

The portion of the law dealing with continuation schools is very short. Communal councils are directed to provide continuation courses for those who have left school, but attendance thereon is not obligatory. Subjects not comprised in the ordinary school course may be taught. At least ninety-six hours' teaching per annum must be given, and the curriculum must comprise at least four subjects, of which two at least must be elementary. The work must be so arranged as to provide complete courses of instruction for children whose parents cannot arrange for them to attend more than ninety-six hours per annum. In all parishes, except those which for the present are excepted, continuation courses for girls must not be held in the evening. For this purpose evening instruction is defined as that which is given after 5 p.m.

The law whose provisions we have thus briefly explained puts the corner-stone to Dutch primary education. The primary schools of Holland are more liberally staffed than our own, and teachers are perhaps better trained than with us. With good attendance, there is no reason why Holland should not take a leading position in Europe so far as its primary education is concerned.



OUR CLASSROOM AIDS.

THE LATE REIGN.

TEACHING NOTES ON THE REIGN OF VICTORIA.

By G. E. Green, M.A., *The Leys School, Cambridge, and* F. L. Green, *Late Scholar of Newnham College, Cambridge.*

I.—PERSONAL AND DYNASTIC.

The Queen's Parents.—1. *The Duke of Kent.* The late Queen resembled, in features and character, her father, the Duke of Kent, fourth son of George the Third. He was born in 1768. While Governor of Gibraltar in 1802, he put down one-third of the wine and spirit houses on the Rock. A mutiny ensued against him, which he summarily suppressed, but was recalled in consequence by the Commander-in-Chief, the Duke of York. He commanded the Seventh Royal Fusiliers, and became Commander-in-Chief of the forces in North America. He came to England in 1819, shortly after the birth of the heir to the throne, and lived for some months at Claremont. The severe winter of 1819–20 led the Duke to visit Sidmouth. He caught a severe cold there, and died on January 23, 1820.

"With the Duke of Kent truth was omnipotent. He could not dissemble." Fisher, Bishop of Salisbury.

"I am the friend of civil and religious liberty all the world over. I am an enemy to all religious tests. I am a supporter of a general system of education. I am supported by my country, and am anxious to devote all my powers to my country."
The Duke of York.

"The Duke of Kent? I recollect him quite well. He was a very bad man. He would not let us drink. He was worse than any teetotaller going, much worse. And then his hours—he was up before the sun; and the parades—he never missed one. There was one word always found in his prayer-book—the word Duty—and by that he swore. He was very near being sent over the Rock for all that." An Old Pensioner at Chelsea.

2. *The Duchess of Kent* was Victoria Mary Louisa, daughter of the Duke of Saxe-Coburg-Saalfield. She was born August 19, 1786, and in 1802 she was married to Charles Louis, Prince of Leiningen. He died in 1814, leaving her with two children. In 1818 she was married to the Duke of Kent. In 1830 a Regency Bill was introduced, providing that the Duchess of Kent should be regent during the minority of her daughter, should she succeed to the throne before attaining her majority. After the accession of the Queen she lived in great retirement, and died at Frogmore in 1861.

Birth of the Queen.—The Queen was born at Kensington Palace May 24, 1819, and was christened a month later Alexandrina Victoria, two of the sponsors being the Prince Regent and the Emperor of Russia.

Education of the Queen.—In 1823 Parliament voted an annual grant of £6000 to the Duchess of Kent for the education of the Princess Victoria. Her general education was entrusted to the Duchess of Northumberland. The princess's governess was Baroness Lehzen. Her tutor was the Rev. George Davys, afterwards Bishop of Peterborough. Lablache gave her singing lessons; dancing was taught her by Mme. Bourdin; drawing by Mr. Westall, the Royal Academician. She learned Latin, French, and German, commenced Greek, and was fond of mathematics, music, drawing, and dancing. In 1831 she was taken to the west of England and to the Isle of Wight; in 1832, to Oxford and Birmingham and North Wales. In 1833 she visited the *Vestal* and another man-of-war. She attained her majority on May 24, 1837. The metropolis was illuminated, and there were many addresses of congratulation.

Accession and Coronation.—William the Fourth died at a little past two on Tuesday, June 20, and at five o'clock the Lord Chamberlain and the Archbishop of Canterbury had an audience of the Queen. Summonses were issued with all possible haste to the privy councillors to attend at Kensington, to present a loyal address of fealty, and to offer homage. The Queen held her first Privy Council at eleven o'clock; the Lord Chancellor (Lord Cottenham) administered the customary oath taken by the sovereigns of England on their accession, in which they promise to govern according to the laws. The princes, peers, privy councillors, and cabinet ministers next took the oaths of allegiance and supremacy, beginning with Ernest, Duke of Cumberland (the King of Hanover). The cabinet ministers having surrendered their seals of office, immediately received them back from the Queen, and kissed her hand on their reappointment. An hour after the council there was a cabinet meeting.

On June 21 the proclamation of the Queen's accession was read. The Queen appeared at one of the windows of St. James's Palace, supported by Lord Melbourne on the one side and by Lord Lansdowne on the other. The Duchess of Kent was also present. On July 13 the Queen removed to Buckingham Palace.

On June 25 the Queen went in state to dissolve the last Parliament of William the Fourth.

On Lord Mayor's Day she paid her first visit to the city as Queen. She opened her first Parliament on November 20.

The Queen's coronation took place on June 28, 1838, at Westminster Abbey. The Archbishop of Canterbury presented her first to the people on the east side of the abbey, then to the north, south, and west. "Sirs," he said, "I here present unto you Queen Victoria, the undoubted Queen of this realm; wherefore all of you who are come this day to do your homage, are you willing to do the same?" This was her recognition: at the oblation, she offered an ingot of gold of one pound weight; at the oath, she knelt and laid her right hand on the Gospels. She was then anointed, seated

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in the chair of Edward the Confessor, and invested in the royal robe. The orb was placed in her left hand, the ring betrothing her to her people on her finger, and the sceptre in her right hand. The cry was raised, "God save the Queen!" The peers then did homage in these words: "I do become your liege man of life and limb, and of earthly worship, and faith and troth; I will bear unto you to live and die, against all manner of folk. So help me God."

Betrothal of the Queen.—Three suitors for the Queen's hand were suggested while the Queen was still very young—Prince Alexander of the Netherlands, whose suit was favoured by William the Fourth; Prince George of Cambridge; and Prince Albert, the second son of the Duke of Saxe-Coburg-Gotha. Prince Albert's suit was favoured by Leopold, King of the Belgians, brother of the Duchess of Kent, who while Prince Leopold of Coburg had been married to the Princess Charlotte, only daughter of George the Fourth, and had lived in England till her death.

In 1836 the Prince visited the Duchess of Kent at Kensington Palace, and favourably impressed both the Queen and her mother. He was born in August 1819, and educated chiefly at the University of Bonn. The Queen's accession for a time put all ideas of marriage out of her head; but a second visit paid by the Prince in 1839 led to the Queen's sending for him at the end of a week. "The Queen sent for me alone to her room, and declared to me, in a genuine outburst of affection, that I had gained her whole heart, and would make her intensely happy if I would make her the sacrifice of sharing her life with her." The Prince was quite carried away by her declaration, and the engagement was speedily made known to the Privy Council. Parliament was informed, a Bill for the naturalisation of Prince Albert was passed by both Houses, and the Queen conferred on him the title of Royal Highness and the rank of a field-marshal in the British army. An annuity of £30,000 was voted the Prince by Parliament.

Marriage of the Queen.—The Queen was married to the Prince on the 10th of February, in the Chapel Royal of St. James's. Lord Melbourne carried the sword of state before the Queen.

Precedence of Prince Albert.—The Queen desired that the Prince should have precedence next to her, but the Duke of Wellington maintained that the heir-presumptive to the crown, the Duke of Cumberland (King of Hanover), and all the members of the English royal family, must rank before the Prince. Finally, the Prince's position within the realm was left to the prerogative of the sovereign. Abroad he was obliged, though the husband of the Queen, to assume the position only of a younger son of the House of Coburg. "When the Queen was abroad, the Prince's position was always a subject of negotiation and favour; the position accorded to him the Queen had always to acknowledge as a grace and favour by the sovereigns she visited. Whilst, in 1856, the Emperor of the French treated the Prince as a royal personage, his own uncle declined to come to Paris, because he would not give precedence to the Prince; and on the Rhine, in 1845, the King of Prussia would not give the place to the Queen's husband which common civility suggested, because of the presence of an archduke, the third son of an uncle of the reigning Emperor of Austria, who would not give the *pas*, and whom the king would not offend."

Home Life.—The Queen breakfasted with the Prince, and gave the morning to state affairs. Luncheon was at two; then Lord Melbourne came to her. Between five and six the Queen rode or drove. Dinner was at eight, and always with the company.

In 1842 there was much depression of trade. To give a stimulus to it, the Queen gave a Court *bal masqué*, in which she appeared as Queen Philippa and the Prince as Edward the Third.

Leading Events of the Queen's Reign.

1840. Introduction of Penny Postage—the system of a uniform rate by weight alone, irrespective of distance—within the United Kingdom.
1842. The Queen's first visit to Scotland.
1843. Opening of the Thames Tunnel.
1844. Opening of the Royal Exchange.
1845. Railway panic.
1846. Osborne built.
1847. Great famine in Ireland.
Prince Consort elected Chancellor of Cambridge University.
1849. Royal visit to Ireland.
1851. Opening of the Great Exhibition.
1852. Discovery of gold in Australia.
1855. Royal visit to Paris. The Great Frost.
1857. The Queen distributed the Victoria Cross in Hyde Park.
1859. Royal visit to Bangor.
1860. Volunteer movement. Visit of the Prince of Wales to Canada.
1861. Death of Prince Consort. Death of the Duchess of Kent. Star of India created.
1862. The Great Exhibition. Cotton famine in Lancashire.
1865. Laying the Atlantic Cable.
1866. Albert Medal created.
1867. Reform riots in Hyde Park. Paris Exhibition.
1868. Queen's visit to Switzerland.
1870. Thames Embankment opened.
1871. The Albert Hall opened. Serious illness of the Prince of Wales.
1872. Thanksgiving at St. Paul's for the Prince's recovery.
1873. Visit of the Shah of Persia. Opening of the Victoria Park, London.
1875. Visit of the Prince of Wales to India.
1876. The Queen proclaimed Empress of India. The Albert Memorial finished.
1878. Cleopatra's Needle brought to England.
1879. The Tay Bridge destroyed.
1882. Phœnix Park murders.
1883. Dynamite scare.
1886. Opening of the Indian and Colonial Exhibition.
1887. The Queen's Jubilee.
1888. Silver Wedding of the Prince and Princess of Wales. Death of the Emperor William, and of the Emperor Frederick.
1889. Parnell Commission.
1890. Engagement of the Duke of Clarence.
1892. Death of the Duke of Clarence.
1893. Opening of the Imperial Institute.
1894. Birth of Prince Edward of York.
1895. Death of the Shahzada.
1897. The Diamond Jubilee. Visit of Nansen to England. Visit of the Duke of York to Ireland.
1900. Queen's visit to Ireland.
Attempted assassination of the Prince of Wales.

Death of the Prince Consort.—The Prince Consort had studied at Bonn the natural sciences, political economy, and philosophy. He had for teachers Fichte, Schlegel, and Perthes. He was fond of music, painting, and fencing. In the winter of 1838–39 the Prince travelled in Italy, accompanied by Mr. Seymour, an Englishman. It was proposed at one time to make the Prince commander-in-chief of the British army, but he declined the office. He originated the Great Exhibition of 1851, and was President of the British Association in 1859. The Prince had a great deal of talent in the management of landed estates. He had a model farm at Windsor, and the grounds at Balmoral and Osborne were laid out in accordance with his designs. He was elected Chancellor of the University of Cambridge in 1847, and was afterwards appointed Master of the Trinity House. In 1857 the formal title of Prince Consort was conferred upon him by letters patent, in order to settle certain difficulties as to precedence that had been raised at foreign courts. During the autumn of 1861 he was greatly occupied with the arrangements for the projected International Exhibition, and it was after returning from a meeting in this connection that he was seized with his last illness. He died December 14, 1861, and was buried at Frogmore.

Children of the Queen, and their Marriages.

1. *Victoria, Princess Royal, Empress of Germany*, born 1840; married in 1858 the Crown Prince Frederick of Prussia, who succeeded his father, William I. of Germany, in March

1888. He reigned three months, and was succeeded by the Queen's grandson, William II.

The German States, except Austria, were combined in a new German Empire, under the hereditary supremacy of Prussia, in 1871.

Princess Margaret of Prussia, niece of the Emperor William I., was married to the Duke of Connaught in 1879.

2. *Albert Edward, Prince of Wales, Edward VII.*, was born in 1841. He married in 1863 the Princess Alexandra, daughter of Christian IX., the first sovereign in Denmark of the House of Glücksburg.

Their daughter, Princess Maud of Wales, was married in 1896 to Prince Charles of Denmark.

3. *Princess Alice*, born in 1843; married in 1863 Prince Louis of Hesse. He succeeded his uncle as Grand Duke in 1877. The princess died in 1878.

4. *Prince Alfred*, born in 1844; a British admiral, and Duke of Edinburgh; succeeded his uncle Ernest II. as Duke of Saxe-Coburg-Gotha in 1893. He married in 1874 the Grand Duchess Marie of Russia.

Saxe-Coburg-Gotha is a duchy in Thuringia, and an independent member of the German Empire. It consists of the two formerly separate duchies of Coburg and Gotha. The total area of both duchies is 760 square miles—about the size of the county of Surrey. The chief industry is agriculture. For its own immediate affairs each duchy has a separate Diet, but for more important and general matters a common Diet. The government is a limited hereditary monarchy, descending in the male line.

The Duchess of Kent was the daughter of the Duke of Saxe-Coburg-Saalfield.

The Prince Consort was the second son of Ernest I. of Saxe-Coburg-Gotha. The Duke of Edinburgh succeeded his uncle under the deed of succession of 1855. The duke died in 1900, and was succeeded by his nephew Leopold, Duke of Albany.

5. *Princess Helena*, born in 1846; married Prince Christian of Schleswig-Holstein in 1866.

Schleswig-Holstein is a maritime province in the north-west of Prussia. It was acquired by that kingdom in 1864.

6. *Princess Louise*, born 1848; married in 1871 John, Marquis of Lorne, afterwards Governor-General of Canada and Duke of Argyll.

7. *Prince Arthur, Duke of Connaught*, born 1850; a British general; married in 1879 Princess Margaret of Prussia, niece of Emperor William I. of Germany.

8. *Prince Leopold*, born in 1853; married in 1882 Princess Helen of Waldeck-Pyrmont. He died in 1884. His son Leopold, born 1884, succeeded to the duchy of Saxe-Coburg-Gotha in 1900.

9. *Princess Beatrice*, born in 1857; married Prince Henry of Battenberg, who died of malaria in the Ashanti War of 1896.

Grandchildren of the Queen.

The most important grandchildren of the Queen:—

1. *Albert Victor, Duke of Clarence*, eldest son of the Prince of Wales, born in 1864. He was engaged to the Princess May of Teck (daughter of the Duke of Teck and the Queen's cousin, the Princess May of Cambridge), but died in 1892 of influenza.

2. *George, Duke of York*, second son of the Prince of Wales. He commanded the cruiser *Melampus*. In 1893 he married the Princess May of Teck. On the accession of Edward VII. he became Duke of Cornwall. Heir, his eldest son, Prince Edward of York, born 1894.

3. *William II., Emperor of Germany*, born 1859.

4. *Princess Alix of Hesse*, born 1872; married to Nicholas II., Czar of Russia, in 1894.

5. *Ernest Louis, Grand Duke of Hesse*, born 1868; married in 1894 the Princess Victoria, eldest daughter of Alfred, Duke of Coburg.

6. *Princess Marie of Coburg*, born in 1875; married in 1893 to Ferdinand, Crown Prince of Roumania.

7. *Leopold, Duke of Albany*, born 1884. Duke of Saxe-Coburg-Gotha, 1900.

Hanover.—The kingdom of Hanover became a province of Prussia in 1866. George I., George II., and George III. were Electors of Hanover and Kings of England, but at the Congress of Vienna in 1815 the electorate was recognised as a kingdom. Ernest Augustus, the Queen's uncle, succeeded William IV. as King of Hanover. His blind son, George V., was deprived of his dominions in 1866. He died in 1878, and his son Ernest, Duke of Cumberland, second cousin of King Edward VII., claims the kingdom.

OUR EMPIRE SUPPLEMENTS.

III.

THE DOMINION OF CANADA.

(See Supplement presented with this Number.)

FIVE days out from Liverpool and we are on the "Banks" of Newfoundland, making for the mighty waterway which leads to the entrance of the palace of "Our Lady of the Snows." The morning is foggy, and the great liner ploughs its way through the fleet of fishing schooners busily engaged in reaping the rich harvest of these seas. Their sails gleam for a few minutes through the haze, larboard and starboard, and the steam siren is continually sending its warning note across the waste of waters.

It is but four hundred years since Cabot, sailing slowly westward, came upon Newfoundland, and named the land Prima Vista—"the first seen"—which name still survives in Cape Bona Vista. But what a change! To him the whole of the west was a blank, filled possibly, to his mind, with those dragons and uncouth animals with which geographers of old were wont to fill the vacant spaces in their maps. To us the whole is known, and the pleasure of visiting is increased by the anticipation of imagination.

To the north lies Newfoundland, the advance guard of the continent—a wilderness of rivers and lakes, with a somewhat scanty population, who live round the coast, and depend mainly on the sea for their subsistence. The interior is in a state of almost primeval solitude, waiting for man to develop its vegetable and mineral wealth. The climate is healthy, and fairly temperate.

To the south-west lie Nova Scotia and Cape Breton Island—the "Acadia" of old times. Founded in 1604 by a few French gentlemen, among whom was the great Champlain, the colony was for more than a hundred years a bone of contention between French and English, and it was not till 1713 that it finally passed into our hands. The ill-will of the French settlers led to their deportation, and on this Longfellow founded his pathetic story of *Evangeline*.

The people are mainly of Scottish descent, and preserve the Gaelic tongue. The country is not unlike Scotland—the same rugged hills, the unexpected mountain lakes, the shaggy woods—but the forests are more extensive. Fishing is the chief industry, and Nova Scotia owns more vessels for its size than any other country. The coast possesses magnificent harbours, that of Halifax alone being able to contain the whole British navy. This harbour has also the advantage of not being frozen up in winter, and thus serves as a winter entrance to the great Dominion. Agriculture is carried on, especially in the Basin of Minas and the lands bordering on the Bay of Fundy and the great Tantramar marsh. There are also valuable deposits of coal and other minerals.

New Brunswick, the largest of the maritime provinces, was also a part of Acadia. It is sparsely peopled with settlers of British descent, with a good sprinkling of United Empire Loyalists—those who remained loyal, in spite of the injustice they had received, when the American colonies broke away from the mother country. The country is highly diversified—hill and valley, river and lake, forests of spruce, cedar, and pine, with here and there a clearing where farming is successfully carried on. The crops of wheat, oats, and barley compare favourably with any in England; fruit-growing—apples especially—is a steadily-increasing pursuit; and the fine herds of Frisian, Holstein, and Hereford cattle bear witness to the successful efforts of the government to introduce dairy farming. New Brunswick is a sportsman's paradise. There is no more enjoyable holiday than one taken in its vast expanse of woods. A start is made perhaps on the head waters of the

Ristigouche in birch-bark canoes, with a couple of Malicete Indians as guides. The lovely scenery—an unending and ever-varying panorama—tempts the artist to lie and gaze all day long; but the sportsman is kept busy. Salmon and trout abound in the clear, cold waters, and may be chased into shallows and gaffed; plover, grouse, curlew, black duck, and teal are continually disturbed; and the woods provide black bear, Virginia deer, the woodland caribou, and—king of all—the moose. Big game is carefully preserved. No one is permitted to shoot without a license, and no one may kill more than one moose, one caribou, and two deer in a season.

"Good moose country," says the Indian; and after supper, just as the moon is rising, the sportsman enters the canoe, and drops silently a mile or two below the camp. The canoe is made fast at a carefully-chosen spot, and the Indian hunter produces a horn made of bark, through which he blows a roaring, bellowing note—an exact reproduction of the challenge of the bull moose. The sound goes echoing and reverberating through the hills, and gradually dies away. A pause, and then another call. Another pause, and from the hillside on the other side of the stream comes the answering note of an angry and jealous moose, and soon in the absolute silence the noise of cracking twigs is heard as he warily approaches the spot where he imagines his rival stands, and waits hidden in the undergrowth. The guide makes a low, defiant grunt, and the giant, all doubt dissipated and jealousy rampant, comes boldly out to the edge of the stream and prepares to cross. This is the critical moment. The Winchester is silently raised and fired, as careful a sight being taken as the dim light will permit. If the sportsman is fortunate, the moose drops, and the soul of the hunter is rejoiced as he gazes on the branching horns and one-thousand-pound body of this monarch of the woods. If it is a miss, the moose disappears, and that, notwithstanding its size, silently. Hardly a twig is heard to crack, but it has gone, and in a few minutes will be miles away, while the hunter returns to camp swearing softly but emphatically. Or if the sportsman, being near the sea, rises before daylight and hides himself on the beach, he may secure a good bag of birds as they come to their feeding grounds—Canada goose, brant, teal, duck, curlew, etc.

But this is a long digression, the tempting theme being the excuse.

We cross the Gulf of St. Lawrence, pass the bleak island of Anticosti, and enter the estuary of the St. Lawrence. The bank is like a rosary, the string of farmhouses being the beads, and the church at every few miles the cross. At last Quebec is reached—the Gibraltar of Canada, with its frowning citadel above, and its rows of old-fashioned houses climbing up the hill beneath. The sight of the town and of the Heights of Abraham beyond touches memory's sympathetic chord, and the drama of the past reveals itself. In 1534 Jacques Cartier, from the picturesque little town of St. Malo in Brittany, came up the river, and landed here at what was then the Indian village of Stadaconé, and went on up stream to Hochelaga (now Montreal). In 1608 Sieur de Champlain, with a handful of followers, founded Quebec—the Indian village had disappeared—and in 1642 Sieur de Maisoneuve made a settlement at Montreal or Villeneuve. For the next hundred years the French colony gradually increased. It took its name Canada from the Indian word *kanatha*, a village. There was continual fighting with the Indians—the cruel and bloodthirsty Iroquois—notwithstanding the heroic attempts of the Jesuit missionaries to convert them. There was also a standing quarrel with the English settlers of New England over the fur trade with the north-west. The attempt to hem the latter in with a chain of forts on the Richelieu and Ohio brought on the Seven Years' War, and in 1759 Wolfe's victory on the Heights of Abraham decided that the destinies of the New World were to be entrusted to the Anglo-Saxon race. In 1763 the whole of Canada passed into our hands. "Only a few acres of snow," was the French king's comment on its loss.

The inhabitants of the Province of Quebec are therefore French by descent, and still speak French, dress in a characteristic way, and present in their homes and surroundings a picture of old-time France. Their *patois* is a strange mixture, as the following verse shows. It is a Canadian Frenchman attempting to talk English.

"Wall, w'en de ole man an' Bateese come off de magazin,
Bateese he los' hees Yankee clothes—he's dress lak Canayen,
Wit' bottes sauvages—ceinture fleché—an' coat wit' capuchon,
An' spik Français au naturel, de sam' as habitant."

The Canadian French farmers, or *habitants*, settled down peaceably under English rule, and remained loyal to us when invited by the American colonies to join them in revolt for they had been treated well, their laws and religion left unaltered, and Protestant England was preferable to the Puritan States. Later on, at the beginning of the previous reign, they rose in revolt, owing to the blundering of the British Government.

"Peace is our portion. Yet a whisper rose
Foolish and careless, half in jest, half hate;
Now wake we and remember mighty blows,
And fearing no man wait."

Since 1867, when the Dominion was formed (largely through the influence of Mr. George Brown of Toronto), they have been loyal; the empire has no worthier or more devoted son than Sir Wilfrid Laurier, the chief Canadian Frenchman. The willing and generous help given in the present war augurs well for the future.

The occupations of the people of Quebec are mainly farming and lumbering. There is no more interesting sight than a lumber camp. In the summer the surveyor selects the district in the woods, and marks the trees to be felled. Early in the fall the camp is built, either on the banks or within easy access of a stream. A shanty is put up for the men—a great dining-room with tiers of sleeping bunks round its walls; stables are built for the horses, and a "kitchen" for the cook. With the first snows the lumberers arrive—tall, athletic figures—from the farms or the fisheries. They are divided into three gangs—teamsters who haul supplies to the camp, those who fell and strip the trees, and haulers who drag the trunks to the river's bank. As soon as the winter sun rises they are up, breakfasted, and out, and through the short day the air rings to the blow of the axe or the crash of the falling giants. When the sun is setting, a blast of the cook's dinner horn summons them back to camp, where a bountiful supper—pork, beans, bread, coffee, and cocoa—awaits them, for the keen air and vigorous exercise create huge appetites. After dinner the fiddle is produced, and song and dance soon pass the short period of leisure till it is time to turn in. When, in spring, the ice melts, the trunks are tumbled into the stream, and float down to the sawmills. Not an uneventful journey, for the surface of the water is covered, and the log-rollers are continually busy, sweeping the banks of those that have grounded, releasing a jam, jumping from log to log, and narrowly escaping death a dozen times daily. Having arrived at the mills, the trunks are speedily sawn up into planks ready for shipment.

Montreal, with its quarter of million inhabitants, is the most flourishing city in Canada. Its public buildings, Notre Dame Cathedral, the University, etc., are worthy of any town. It is the terminus of the Canadian Pacific Railway, a magnificent bridge spans the St. Lawrence, and the Bonsecours Market is one of the busiest in the Dominion. Winter in Canada is the chief time for outdoor amusements. When agricultural operations are suspended by the iron King Frost, and the country is covered with a level, white mantle of snow, there is ample leisure time; and the young Canadians, clad in thick, warm, white woollen clothing, go forth skating, sleighing, ski-ing, tobogganing, playing hockey, hunting, or ice-yacht sailing, and the air is filled with peals of merry laughter. In the early spring farm-work is resumed in earnest; and, in the Province of Ontario, dairy farming, wheat-growing, stock-raising, the cultivation of hops, tobacco, peaches, apples, grapes, and strawberries, occupy every hand. The peninsula between Lakes Huron and Erie and Ontario is the most densely peopled district in Canada, and Toronto, Kingston, Buffalo, and Hamilton are busy towns. The great lakes are crossed by regular lines of steamers, and a brisk trade with the States is carried on.

At Montreal we enter the luxurious cars of the Canadian Pacific Railway for a five days' run of upwards of three thousand miles across the continent. Ottawa is passed, selected

Provinces.		Area in sq. miles.	Population.	Chief Towns.	Industries.
Ontario.	Formed the original Dominion, July 1, 1867.	222,000.	2,114,321.	Toronto, Ottawa, Hamilton, London, Kingston.	Agriculture, lumbering, fruit-farming, fishing, manufacturing, dairy-farming.
Quebec.		347,350.	1,488,535.	Quebec, Montreal, Hull, Three Rivers, Sherbrooke.	Lumbering, dairy-farming, fisheries.
Nova Scotia.		20,600.	450,396.	Halifax.	Lumbering, agriculture, fruit-growing, mining.
New Brunswick.		28,200.	321,263.	Fredericton, St. John.	Lumbering, agriculture, fruit-growing, mining, and fishing.
Manitoba.	Admitted 1870.	73,956.	225,000.	Winnipeg, Brandon.	Farming.
British Columbia.	Admitted 1871.	383,300.	179,000.	Victoria, Vancouver, New Westminster, Nanaimo.	Lumbering, mining, and fishing.
Prince Edward Is.	Admitted 1873.	2,000.	109,078.	Charlottetown.	Farming and fishing.
Districts created.					
Keewatin.	1876.	756,000.			
Assiniboia.	1882.	90,340.		Regina (capital).	
Saskatchewan.	1882.	114,000.		Prince Albert.	
Alberta.	1882.	100,000.		Calgary, Banff.	
Athabasca.	1882.	251,300.	100,000.	Dunvegan.	Farming, ranching, mining, and hunting.
Yukon.	1898.	198,300.		Dawson City.	
Ungava.					
Mackenzie.	1895.	1,019,200.			
Franklin.					
Area of great rivers and lakes.		47,400.			
	Total:	3,653,946.	4,987,593.		

in 1858 as the capital of the Dominion, then an Indian village, now a stately town; and soon we are threading picturesque scenery, with traces of man's presence few and far between. The northern shores of Lake Superior are skirted; Port Arthur, a busy lake port, is passed; and on the second day we run out on to the vast prairie region of Manitoba, the keystone of the mighty arch of sister provinces which spans the continent. Winnipeg, on the Red River, is its chief town.

In 1670, King Charles, in a fit of generosity or ignorance, gave Prince Rupert "all the land drained by the streams running into Hudson Bay," some 2½ million square miles, for "two elks and two black beavers" per annum. The Hudson Bay Company worked the fur trade with great profit, and established trading forts at wide intervals up and down the rivers and lakes. Fort Garry was founded in 1811, and remained a small and isolated place till the Canadian Pacific Railway opened communication with the east. A rising of the half-breeds in 1870, when the Dominion had bought out the Hudson Bay Company, was quelled by General Wolseley. Since then Fort Garry has rapidly grown into Winnipeg, a town of 40,000 inhabitants. The prairie land, with its deep, rich black loam, is ideal country for wheat-growing, and this is the principal occupation. The line from Winnipeg through Brandon, Qu'Appelle, Regina, Moose Jaw to Medicine Hat runs everywhere through most attractive country. This has been carefully surveyed and marked out in allotments, consisting of sections of 160 acres, one of which is given free to any *bonâ fide* settler.

Alberta is a ranching province, where vast herds of cattle roam the plains, their freedom interfered with only twice a year, when the "round-up" takes place, and when many of them are selected for a month's journey over the Canadian Pacific Railway and the Atlantic to the cattle-yards of Liverpool or Deptford. The cowboys are fearless and strong, and some of the best riders in the world; and well they need be, for "broncho-busting" (breaking in a wild horse) or "cutting-out" (driving one particular bullock out of a herd of a thousand) demands brains, strength, and dexterity.

But more dreaded than anything is a stampede. A bunch of a couple of thousand cattle are lying peacefully under the starlit skies, and dotted round them are some fifteen or twenty mounted cowboys. A flash of lightning, the howl of a coyote, a single bellow, any slight noise, may make every animal spring to its feet in a panic of terror, and with the noise of thundering hoofs the whole herd starts in a mad rush across country. To attempt to stop them is useless; man and horse would be hurled to the ground, and pounded into shapeless masses. They must be headed, and the ponies fly by the side of the rush till the leaders are reached; then voice and whip are used to bend the herd from a straight line, and this is continued till they are "milling," or running round in a circle. Then the panting cowboys pause to regain breath, and try to quiet the frightened beasts by singing! Their everyday language is usually "frequent and painful and free," and their repertoire of songs somewhat limited; and it is amusing to hear great bearded fellows drawling out to a mob of wild cattle the hymns they learned at their mother's knee in some quiet English farmhouse.

It was from these men that Lord Strathcona raised his troop of rough riders for the war—the noblest of all individual gifts.

Alberta has another source of wealth in the coalfields of the Lethbridge district.

The line climbs the Rockies through magnificent scenery. In winter the train runs under snow sheds, but in summer an outside track is used. The descent into British Columbia over the famous loops is one of the finest pieces of engineering ever done. The line descends the steep declivity in a series of zigzags, sometimes running through pine forests,

and at other times crossing a gorge on a lofty trestle bridge which makes one dizzy to look from.

The scenery soon exhausts the traveller's stock of enthusiastic words, and reduces him to silent wonder. The eye watches with delight the green valleys, the rushing river, the peaceful lake, the sombre pine forests which clothe the foot-hills and lower flanks of the mountains, and in which the winds produce a deep note like the diapason of a grand organ; the bare rocks above, and, crowning all, the summits of the sierras clad in purest white, solemn, serene, and immutable, where the only sound that breaks the awful silence is the roar of the falling avalanche or the scream of the eagle.

The train runs through the valley of the Fraser, famous for its salmon, which during the season ascend the river to the spawning grounds in such numbers that the stream is one wriggling mass of fish which may be caught with the hand. They are taken in thousands for the canning factories dotting the banks.

At last Vancouver is reached, and a splendid ferry takes the traveller over to Victoria, on Vancouver Island, "the newest city of the West."

British Columbia was occupied by the factors of the Hudson Bay Company only till 1856, when the discovery of gold on the Fraser and Thompson led to the "Cariboo rush." In 1871 it joined the Dominion, stipulating that a railway should be made to connect it with the far east.

Lumbering is the most important pursuit; the Douglas fir grows to the height of 200 to 300 feet, and is as straight as an arrow.

Vancouver Island is rich in minerals, and possesses in Esquimalt one of the finest harbours on the Pacific.

Can we say, after this rapid journey, that we have seen Canada? Certainly not. The settled part is but a thin ribbon across the continent. From the railway northward for nearly 2,000 miles stretch the great North-West Territories—Saskatchewan, Athabasca, Keewatin, Mackenzie, Yukon, and Franklin; an enormous territory of prairie in the south; then the great Lone Land of primeval forest, penetrated only by Indian trappers and half-breed *voyageurs*, who traverse in their birch-bark canoes its vast lakes and rivers. Farther north the deciduous trees disappear; the pines of the Pine Barrens alone remain. These dwindle in size under the rigorous cold till they are represented by old, old trees only a few inches in height. Even these cease, and beyond lies a treeless waste of snow, where the musk ox and arctic fox range; and farther away still is that icy north where Franklin and his gallant crew lost their lives, and where the Esquimaux wander, cut off from the civilised world as though they belonged to another planet.

What are the general impressions caused by such a glimpse at Canada? First, its vastness; secondly, its wonderful diversity of character; and, thirdly, the paucity of the population.

Over three and a half million square miles, with a population equal to that of London! Think of it! Not barren veldt, or sandy desert, or tropical miasmatic swamp, but for the greater part splendid country, well watered and wooded, with a magnificent climate and vast mineral wealth, asking and imploring man to come and take it.

"Come out of your old world," says Nature. "Shake off the absurd trammels of civilisation. Come out here; be free, be men! Leave your crowded cities and your worn-out land; give up your halfpenny evening newspaper, your public-house bars, your artificialities, and the excitement which you falsely call life, and come to me. What can I give you? The finest heritage any man can ask for—health, strength, and competence. I want no weaklings, no paupers, no grumblers, no idlers, no failures, but *men*—ten, twenty, fifty millions of them. You shall have British laws and customs, justice and equity, such keen and pure air as you have never dreamed of, and more than an adequate recompense for your toil. In twenty years you can leave it. You can return to your crowded and unhealthy cities if you like, but you will not. Your head shall be clear, your bones and muscles firmly knit by attractive and remunerative toil; your children shall be healthy and strong, and, like the patriarchs of old, you shall have flocks and herds in abundance. Only be brave; quit you like men; be strong. Fair shall be your lot, and goodly shall be your heritage."

The Dominion of Canada is a Federal Union, founded in 1867.

The central government consists of—

1. The Governor-General, representing the King. (The Earl of Minto.)
2. Senate of 81 members, appointed for life by the Crown.
3. House of Commons of 213 members, elected by the people for five years at longest.

For additional reading and reference, the reader is referred to the following books:—

CANADA UNDER BRITISH RULE, 1760–1900. By Sir John G. Bourinot. (Cambridge Press.) (See Editor's Table this issue.)

THE STORY OF CANADA. (Horace Marshall and Sons.)

THE CANADIAN YEAR BOOK.

CANADA. An excellent text-book prepared by the Canadian Government for use in British schools.

Together with the numerous HANDBOOKS presented gratis by the High Commissioner for Canada and the Agents-General of the various provinces.

The Canadian Pacific Company also issue gratis some interesting GUIDE BOOKS and PAMPHLETS.

HISTORY UNDER THE PRESENT CODE.

BY THE HEAD TEACHER OF A LARGE BOARD SCHOOL.

"THE old order changeth, yielding place to new," and many teachers are finding that the new educational order, with all its liberty and breadth, has its difficulties. With the same amount of time, the same staff, and in most cases the same apparatus, books, etc., very great changes in school work are found to be impossible.

Even the introduction of so essential a subject as history is difficult. The suggestion in the Departmental schemes—the exposition of the History Reader—does not commend itself to all, and yet we hesitate to add another lesson requiring great preparation to the weekly task of an upper standard teacher.

The difficulty may, however, be met if the teaching of history be co-ordinated with that of as many other subjects as possible. It is not necessary now to teach fragments of geography, of grammar, etc., with little or no connection with each other. With a little trouble it is possible to arrange for lessons on geography, history, reading, composition, and recitation to bear each on the other, instead of taking them as five different and distinct subjects of instruction.

For example, the English language and English history are very closely related. A course of lessons can be arranged to include instruction in both. Suitable geography lessons immediately suggest themselves; reading lessons will supplement the oral instruction, and the recitation will illustrate it.

The following list of lessons is suggestive of such a scheme. It is arranged for Standard VII., but, with necessary alterations, subtractions, and additions, can be adapted to begin with Standard IV. and continue in the higher standards.

A Course of Lessons tracing the Development of the English **Language** *with the Development of the English* **Race.**

I. Lessons on—

The simple life of the Saxons: consequent simplicity of language; pure vocabulary. Words derived from the Anglo-Saxon.

II. Lessons on—

(*a*) HISTORY.	(*b*) LANGUAGE.
The Norman Conquest; the Feudal System.	Introduction of Norman French. Words relating to church, law, feudal system.

III. Lessons on—

The introduction of printing; the "New Learning."	Additions from Latin and other sources as a result; Latin prefixes and affixes.

IV. Lessons on—

The development of English literature in Elizabeth's reign.

V. Lessons on—

(*a*) History.

The growth of the English power at sea.

(*b*) Language.

Words derived from foreign sources as a result of travel and commerce.

VI. Lessons on—

Inventions of the present century.

Words added from Greek and other sources in connection with inventions, science, etc.

Reading and *Recitation* from the works of Tennyson, as a leading writer of nineteenth century English.

Geography lessons on the lands inhabited by the English-speaking race—that is, the principal colonies, and the United States of America.

OUR ILLUSTRATED GEOGRAPHICAL NOTEBOOK.

CHILE.

MANY of the South American republics are noted for the spirit of unrest that marks the conduct of their internal affairs; and unsettled government and insecurity of property at home are synonymous with financial discredit abroad, which militates against any real and successful attempts at progress.

Chile, however, has to a great extent emerged from this category, and her credit stands higher than that of any other South American state. The population of the country is estimated at 3,200,000. Unlike most of her sister nationalities, white blood predominates, in the upper classes at least—a fact that probably accounts for the superiority of her people. The bold and warlike Araucanian Indians predominate only in the south. In education, which is free and provided by the State, Chile has far surpassed her neighbours.

The country was subjugated by Valdivia in 1541, and remained under the Spanish yoke until 1810, when Chile declared its independence, which was sealed by a victory over the Spaniards at Maypu in 1818. In 1879 the Chilians took up arms against Bolivia and Peru; in May 1880 they totally routed the Peruvians at Tacna, and a month later the southern army of Peru was almost exterminated at Arica. In January 1881 the Chilian army again obtained a complete victory near Lima, which they afterwards occupied without opposition. In June 1883 terms of peace were agreed upon, by which Chile acquired the coast between 23° and 25° S.—hitherto claimed by Bolivia—the absolute cession of the Peruvian province of Tarapaca, and the occupation of the provinces of Tacna and Arica for a period of ten years as security for the payment of a war indemnity. Since that time the country has had little to disturb its tranquillity, with the exception of a rebellion in 1891 against President Balmaceda, who aimed at dictatorial powers. Balmaceda's forces were defeated near Valparaiso, and the flight and suicide of the discredited statesman smoothed the way for a cessation of hostilities.

Chile consists of a strip of territory lying between the Andes and the Pacific Ocean; its entire length is not less than 2,500 miles, with a breadth varying from 40 to 200 miles, and an area of about 294,000 square miles. The climate of the country varies very considerably, owing to its great extension from north to south: in the north it is hot, and there is an almost entire absence of rain; the central regions are temperate, and well suited to agriculture; the Patagonian region, in the south, is densely forested, and sparsely inhabited by Indians.

The chief occupations are mining and agriculture. The mineral wealth is very extensive: the rainless regions of the north yield nitrate of soda, iodine, gold and silver; the centre yields copper and silver; in the south are extensive deposits of coal and iron. In 1899 the yield of copper was 23,554 tons, ranking fifth in the world's output of this metal.

Wheat, maize, barley, vine, coffee, tobacco, hemp, and flax are cultivated successfully. There is usually a considerable surplus of wheat (average crop equals 14,000,000 bushels), and no less than 57,000 cwt. of coffee was exported to the United Kingdom last year.

In railway construction Chile was the first in South America; over 2,500 miles of line are open.

	1898.	1899.
Imports from the United Kingdom	£1,855,771	£2,443,498
Exports to the United Kingdom.....	3,633,532	4,211,590

The total foreign trade amounts to over £20,000,000.

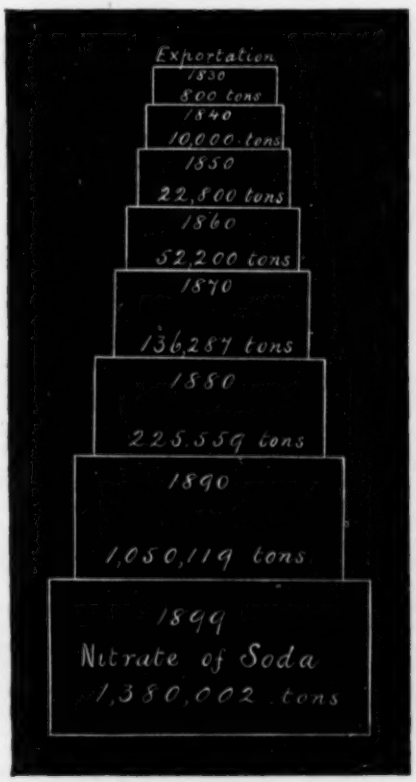
The imports are chiefly cotton, woollen, and iron manufactures; the exports are nitrate of soda, iodine, other minerals, wheat, hides, and guano.

The chief ports are Valparaiso, Iquique, Talcahuano, Coquimbo, Antofagasta, and Pisagua. The average distance of these ports from the British Isles, *viâ* Cape Horn, is about 11,000 miles. The accomplishment of a canal across Central America would lessen the voyage by about 2,000 miles, and would probably give a great impetus to Chilian commerce.

Santiago, the capital, stands near the base of the Andes, 115 miles inland from Valparaiso. The city is lit by gas and electric light; the houses are usually of one story, owing to the prevalence of earthquakes, to which the whole of Chile is more or less liable.

The Nitrate Industry.

The cession of Tarapaca to Chile was practically the transference of the nitrate industry, since this is the district where



the richest deposits lie. The value of the concession may be gauged from the statement that more than one-third of the total revenue of Chile is derived from the export duty levied on nitrates.

The railway from Pisagua is in the direction of Tarapaca. It does not, however, reach this city, but, turning south, runs to Montevideo (not to be confounded with its Uruguay namesake), soon after which it turns westward, and again reaches the coast at Iquique. It is called the Nitrate Railway, and its whole distance of 125 miles is marked by quite

eighty nitrate works, many of which are worked by British capital. The following is Sir W. H. Russell's description of the nitrate country:—

"Assuredly there is nothing to charm the eye in the scenery around us. I remember nothing like it save the bed of the Bitter Lakes at Ismailia before M. de Lesseps opened the flood-gates and let in the sea water on the basin of salt and sand. The description of Darwin in 1835 will apply to what we gazed on to-day,—

"'The appearance of the country was remarkable, from being covered with a thick crust of common salt, and of a stratified, saliferous alluvium, which seems to have been deposited as the land slowly rose above the level of the sea. The salt is white, very hard and compact; it occurs in water-worn nodules projecting from the agglutinated sand, and is associated with much gypsum. The appearance of this superficial mass very closely resembled that of a country after snow, before the last dirty patches are thawed. The existence of this crust of a soluble substance over the whole face of the country shows how extraordinarily dry the climate must have been for a long period.'"

The nitrate mine requires no shaft, for the *caliche*, or raw material, lies but a few feet below the surface. When it has been located, a boring is made, and, by means of blasting, the ground is thoroughly disintegrated in every direction. The *caliche* is then separated from other useless strata and conveyed to the crushing mills. It issues thence in the shape of a coarse-grained powder, which is placed in boiling tanks, from which it passes to precipitating receptacles, where the process is completed.

The ordinary nitrate of commerce contains 95 per cent. of nitrate of soda, and is chiefly used as an agricultural fertiliser; refined nitrate contains a larger percentage, and is used in the manufacture of chemicals and explosives.

The Nitrate Trophy at the Paris Exhibition attracted considerable attention. Its principal feature was a pyramid of cubes representing the increasing volume of the export of nitrate of soda from Chile since 1830, of which our diagram is a copy.

In 1899 Germany took over 500,000 tons; France, 261,000; United States, 155,000; Belgium, 153,000; and the United Kingdom, 125,000 tons—these five countries alone accounting for about thirteen-fifteenths of the whole supply.

However largely the demand for nitrates may increase, Chile will be able to meet it for very many years to come. At present only the best *caliche* is treated, and much of that which is discarded could be profitably worked if necessary.

The value of nitrates in agriculture has been proved by the most careful experiments, of which let the following suffice. Ten acres of barley were injured by frost. Part of it was treated with nitrates; the result was seven bushels more of grain, which was of better quality than that obtained from the portion left undressed. This result was obtained at a cost of 6s. 4d. per acre.

The retail price of nitrate of soda at the present time is about 10s. 6d. per cwt.

Iodine is also a valuable product of the nitrate regions. The *caliche* frequently contains iodate of soda, from which crude iodine is obtained during the precipitating processes. It is pressed into cakes, which are placed in a retort to undergo sublimation. The iodine of commerce appears in the form of crystals, which are packed in barrels of 33 lbs., rendered air-tight by a covering of skin and a coating of pitch. Iodine is valuable in medicine as an external irritant, and also in the manufacture of aniline dyes.

Most of the nitrate towns are unique in that they exist in a veritable desert, where rain falls only at intervals of perhaps many years, and where almost every necessary of life has to be brought from a distance. Darwin recorded that water had to be conveyed in boats from Pisagua to Iquique, where it was retailed at 4s. 6d. per 18-gallon cask. Nowadays condensers provide much water, and mains have been laid by the Tarapaca Water Works Company, which convey water to the coast regions from Pica, on the west of the Pampa del Tamaragul. "The nitrate towns tax the resources of all parts of the earth, and in return they sell that which enriches exhausted fields, and gives fresh life to the worn-out agricultural lands of Europe."

A COURSE OF OBJECT LESSONS FOR GIRLS' SCHOOLS.

BY WILLIAM DONE, B.A.,

Head-Master of Brighton Pupil Teachers' School.

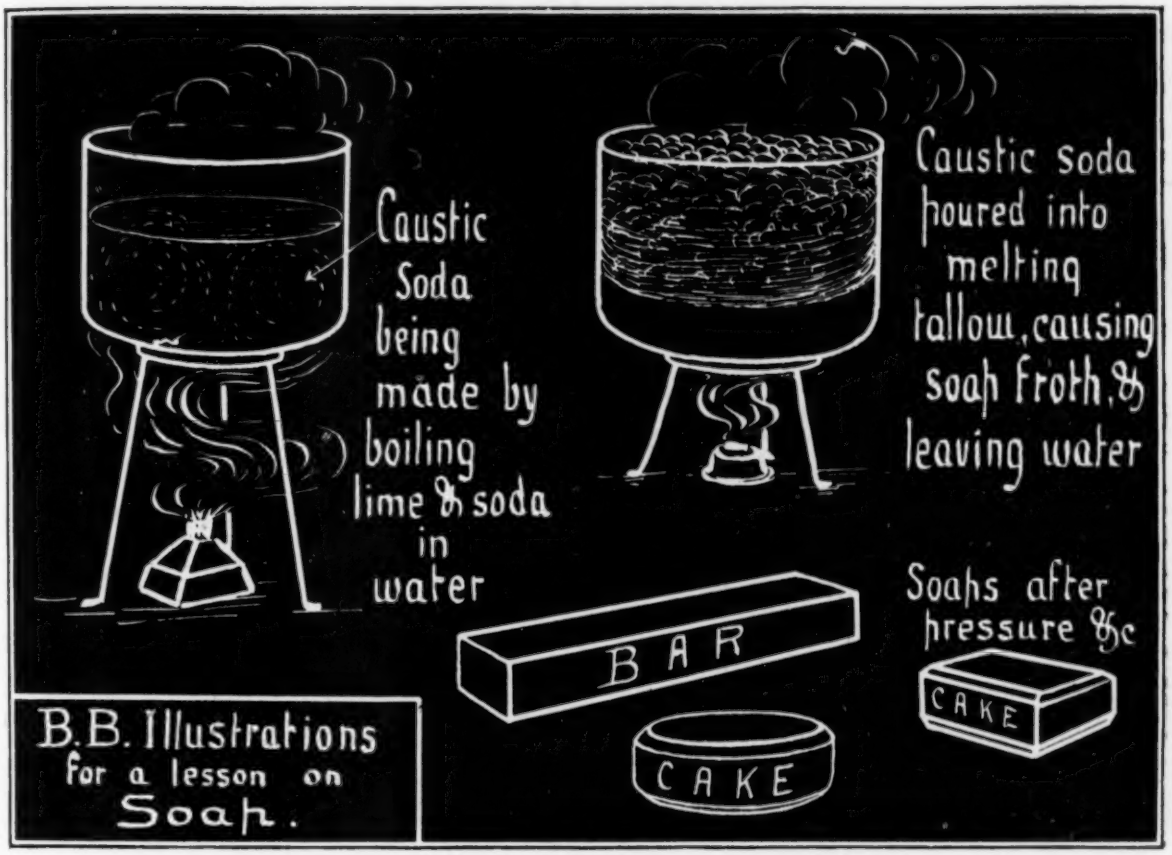
III. HARD AND SOFT WATER.

Articles of Illustration.—Two or three large jugs of rain-water; a bucket of tap-water; some thin large glass tumblers which will stand boiling water being put into them; soap; a well-furred kettle; two clean patty-pans; a fire or its equivalent; some bowls for washing.

Experiment or Illustration.	Result and Inference.
Take two bowls of water, one of rain-water, the other tap-water. Ask two girls to come in front of the class and wash their hands with soap. Set the bowls where the class can see into them.	The girl who is washing her hands with the rain-water makes a lather with the soap immediately; the other girl uses more soap, and a scum comes first on the water before any lather can be made.
Repeat the experiment with two more bowls, one of rain-water, the other of tap-water which has been boiled for some time and become cold again.	The lather comes almost as quickly with both kinds of water, and there is an absence of the scum.
Question the girls as to which kind of water their mothers prefer to use at home for washing purposes.	The mothers prefer to use the rain-water, which they call soft-water, for the reason made clear by the first experiment: it requires less soap, and saves time and trouble.
Take two glass vessels. Into one put tap-water which has been boiling for some time, into the other put ordinary tap-water. Compare their appearances.	The hot water has a dull, cloudy appearance, in distinct contrast with the bright sparkling cold tap-water. This cloudy appearance is more pronounced towards the bottom of the vessel, and seems to show some sediment depositing.
Examine a glassful of the boiled tap-water previously prepared and set by to cool.	The water has become clear, or almost so, and a thin white covering is seen on the bottom of the glass.
Before the lesson, place two clean patty-pans over the source of heat, one containing rain-water, the other tap-water. The water in each having evaporated to dryness, show the result.	One patty-pan shows a slight deposit, and from the previous lesson it is inferred that the water evaporated from this one contained matter in solution.
Trace the course of the tap-water backwards—the pipes in the house, through the streets, the reservoir, the ground, the rain. Refer to the previous lesson on the solvent properties of water.	The tap-water, originally rain-water, in its journey over and through the ground, has dissolved certain solid substances which have been recovered again by evaporation.
Question as to the nature of the ground in the neighbourhood—perhaps a limestone or chalky district. Tell them that there is always more or less of a gas called carbonic-acid gas (about which we shall learn more later on) in the ground, and this gas, with water, has the property of dissolving lime or chalk.	Evidently when we heated the water the gas was driven off, and the insoluble material showed itself as tiny particles slowly sinking to the bottom.
Show a furred kettle. Break off a piece of fur and pass it round the class.	The fur is very likely this deposit which has accumulated. [The teacher confirms this.]

IV. SOAP.

Articles of Illustration.—Various kinds of soaps; a tallow candle; some washing soda; a pinch of lime; a little common salt; a saucepan; a fire or its equivalent. [The teacher should make a piece of soap previously to the lesson being given, since


Caustic Soda being made by boiling lime & soda in water
Caustic soda poured into melting tallow, causing soap froth, & leaving water
BAR
CAKE
Soaps after pressure &c
CAKE
B.B. Illustrations for a lesson on Soap.

the boiling compound takes some time to cool down sufficiently for the cake to harden on the surface.]

Experiment and Illustration.	Result and Inference.
Take two plates, one of which is dirty, but not greasy, the other being greasy. Let two girls wash these plates with hot water.	The greasy plate will not become clean. Evidently hot water alone will not dissolve grease.
Put a piece of soda into the water and try again.	The plate speedily becomes clean. Soda and water dissolve fat.
Repeat the experiment, using soap.	Soap acts in a similar way.
Make a strong solution of caustic soda by boiling a handful of soda with a spoonful of lime in about half a pint of water. Pour off the clear solution from the excess of lime.	The teacher will tell the class that the soda has become slightly altered, and is now in solution as what is called caustic soda. Give also the name alkali.
Take the saucepan, add a little water, place it to boil, and scrape in flakes a part of the tallow candle (about a quarter of it) into the vessel. Let it boil, and then pour in from time to time the caustic-soda solution.	The addition of the caustic soda to the melted tallow causes the mixture to froth up, and we have to keep stirring it and to moderate the heat in order to prevent it frothing over.
Continue the boiling very gently, stirring the contents of the saucepan.	The frothy appearance looks something like a soap lather.
Remove the vessel from the fire, throw in a little salt, and set aside to cool.	The mixture has resolved itself into a more or less spongy mass at the top, floating in a liquid. [State that the addition of the salt only hastened this separation.]
Squeeze the spongy mass into a more compact cake. Show a similar cake prepared previously to the lesson. Repeat the experiment of washing a greasy plate with either of these cakes.	The substance we have made acts just like soap. It feels like soap. It looks something like a piece of white soap that has been left in water for some time. [Teacher confirms.]
Ask now for the reason why, in our first experiment, the soda dissolved the grease.	The soda combined with the fat and made a soap.

The Action of Soap on Hard Water.—Recall to the children's minds the previous lesson as to the action of soap on hard water.

Before the water would form a lather, we noticed that a white scum was produced on the surface. This scum was made by the soap combining with the lime in the water, and no lather could be formed until this lime was thus removed from solution. Hence elicit that hard waters are not so economical for domestic purposes as soft waters, owing to the waste of soap they involve.

The Action of Soap in Washing.—The children have seen that both soap and soda will dissolve fat, and that water alone will not clean greasy things. Take the case of washing the skin. Small particles of fatty matter are continually accumulating on the skin, coming through the numerous pores of the body, and getting mixed with dust and other impurities. We might cleanse our bodies by using soda and water, but the burning or caustic action of the pure soda would be unpleasant and harmful to the skin. But by using soap there is just sufficient excess of alkali in it to dissolve the fatty particles, so that finally a lather is produced which the water washes away, and carries with it the dirt and other impurities.

The Manufacture of Soap.—Tell the children that soap is manufactured on a large scale in a very similar manner to the way in which we have made it. The fats used may be tallow, any kind of dripping, palm-oil, fish-oil, etc. To ensure the maximum amount of soap, the operation is repeated several times. The watery soap is then boiled for some time, to drive off much

of its superabundant water. When it is fairly solid it is cut into cakes and bars, and further allowed to dry. Refer to soap purchased new, and the same stored away for some time, to show how the excess of water passes off. Show the economy of buying and storing soap.

Kinds of Soap.—Show specimens of various kinds of soap.

Pale Yellow.—It owes its colour to the presence of a little resin, which improves it. It is a very good, economical soap.

Mottled Soap.—A good, cheap soap for household purposes. Owes its streaky appearance to substances used in its manufacture. Too strong for the skin.

Toilet Soaps.—Usually white soaps coloured and scented.

Soft Soap.—Formed from fats and caustic potash. Its action is too strong for ordinary washing purposes.

PRACTICAL ELEMENTARY SCIENCE.

AN EXPERIMENTAL COURSE COVERING THE REQUIREMENTS OF BOTH THE DAY AND EVENING SCHOOL CODES IN PHYSICS AND CHEMISTRY.*

BY THOMAS CARTWRIGHT, B.A., B.SC.

Water.—The work that has already been done with water should first of all be recapitulated. Thus, a measured volume should be weighed, in order to show that the weight of a cubic centimetre is a gram. The boiling point should be obtained by placing a thermometer in the steam proceeding from a flask in which water is boiling, and the freezing point by placing a test-tube containing water in which a thermometer is immersed in a mixture of ice and salt, or of sodium sulphate and hydrochloric acid. The solvent power of water should also be shown by placing some salt or sugar in a beaker containing water; and evaporation should be shown, as well as its use in recovering dissolved substances, by boiling off the solutions thus made. The effect of water on crystallisation should be shown by heating some washing-soda in one test-tube and some blue vitriol in another, to prove that both colour and form may be due to the water thus held in combination. Reference should also be made to the part played by water in bringing about the combination between iron and oxygen in the rusting experiment—a fact of exceeding great importance, since it is certain that very many equally common phenomena could not arise were it not for the presence of water in minute quantities.

The presence of water in air should also be shown by bringing into the room a flask filled with ice-cold water; and the connection between this dimming of the glass and dew-formation should be well driven home. The converse fact of the presence of air in water should also be demonstrated by boiling a large can or flask and collecting the air that is driven off in a gas-jar. Nor should the fact be lost sight of that we ourselves, in common with all plants and animals, consist mainly of water. It may be desirable to weigh, say, a piece of cabbage stalk, and then to dry it in the steam oven, in order to bring the fact well home. Far from despising these homely experimental proofs of the utility of water, the teacher of science should use every endeavour to multiply them; for in proportion as he brings his teaching into relation with the facts of everyday life, will it become interesting and valuable to his hearers. Moreover, these simple experiments are frequently more convincing than any that could be performed with the most valuable apparatus. What, for example, could be more demonstrative of the solvent power of water than its use in washing clothes and houses? and where could there be a better proof of the fact that water is absorbed by air than in the drying of clothes? Not to further labour the point, we will conclude this preliminary disquisition by the statement that an exceedingly valuable lesson may be spent in drawing attention to all that may be learned from the experiments that are daily being performed with water in the ordinary course of everyday life.

* Books referred to in this series of articles are published by T. Nelson and Sons.

The Metal Sodium.—As we are to start our chemical examination of water by means of this body, it will be wise to see what can be learned of this metal itself before utilising it in our experiments. It should be carefully noted that sodium must not be handled with wet fingers, and the less it is handled the better it will be. It should be asked why the substance is kept in naphtha; and the reply, that it is in order to keep it from the action of the air, which will readily be forthcoming, will be found useful in what follows. Taking a knife, the teacher should next proceed to cut the metal, when attention should be paid to the shining surface and to the changes that it rapidly undergoes. A small pellet of the size of a pea may now be thrown into a saucer of water, and again there is much to observe. Why does the metal not sink? Why does it assume the globular form? and finally, why does it get smaller and smaller and gradually disappear? This question will make clear the fact that sodium, in its density, its softness, the ease with which it melts, the transient existence of its lustre, is a very different metal from those met with ordinarily.

Inflammable Gas.—A small piece of composition gas tubing of about ¼" bore is completely closed at one end. Into the other end is pressed a piece of sodium of about the size of a pea, and this end is now nearly closed, a space about sufficient for the insertion of the blade of a knife being left. The children should be asked to explain why this is done, bearing in mind what happened when the little piece of sodium was placed in the water in the previous experiment. A test-tube is now completely filled with water, and, holding the thumb over the mouth, it is placed under the surface of the water contained in a good-sized saucer or other shallow vessel, so that not much water will be used, whereby the effect of the sodium upon the water will be more readily apparent than if a larger volume of water were employed. The tube containing the sodium is now thrown into the water contained in the saucer, and the mouth of the test-tube is placed at the end of the gas-pipe containing the sodium, without allowing any of the water from the test-tube to escape. It will be for the children to give a reason for what happens, especially for the descent of the water in the test-tube. Placing the thumb again over the mouth of the test-tube, the teacher withdraws it from the water, and, holding the mouth downwards in the air, applies a light to it. Again it will be for the children to describe and explain—always, of course, in their laboratory books—what has happened. The gas that is thus obtained from water was originally called **inflammable air or gas** (all gases were called airs by the early chemists). The propriety of this term should be readily apparent to the dullest child who has carefully followed the experiment. Another way of performing the experiment is to wrap the sodium well round with a piece of copper wire, sufficient wire being left with which to hold the metal under water, where it is placed under the mouth of the test-tube. The advantage of this mode of procedure lies in the fact that the sodium again shows its lightness by promptly rising to the surface of the water in the test-tube. Care should be taken not to keep the mouth of the test-tube tightly pressed to the bottom of the saucer; otherwise, if more gas is evolved than will fill the test-tube, there may be an explosion. Again the sodium may be wrapped up in a piece of wire gauze, which may be held at the bottom of the saucer by a piece of copper wire attached to the gauze. Boil a little water, and place it in the saucer instead of the cold water, and then throw a small pellet of sodium on the surface of the heated water. The class should be able to tell what is the reason for the flame that will now be observed. Other metals, such as iron and magnesium, may next be placed in the water, in order to see whether they behave in the same way as the sodium does; and, if so desired, it may be shown, by using a pellet of potassium, that there are metals which behave even more vigorously than sodium towards water. The water in which the experiment has taken place may be felt with the fingers, and may also be tested with red litmus. Further, just the tip of the little finger may be placed in the water, and be placed on the tongue, in order to see if any change has taken place in the taste of the water; and finally, a portion of the water may

be evaporated in a watch or clock glass, in order to recover some of the substance that has been taken up by water, and has so changed its properties. In particular, it should be observed whether or not this recovered substance resembles or differs from the sodium that has given rise to it.

Iron and Water.—It has already been seen that iron has no effect whatever on cold water. It is now to be seen whether this is the case when the water is boiling, or, rather, when it has been converted into steam. The apparatus required consists of a piece of hard glass tubing about eight inches long, and of half-inch bore, for which may, at the option of the teacher, be substituted a length of iron tubing, such as a gun barrel, which answers admirably. The tube is provided at each end with a cork carrying a piece of glass tubing, which is connected at one end with a glass flask containing the water which is to be boiled, and at the other with a tube passing under a beehive shelf covered with water in a bowl, and having an inverted gas-jar filled with water over the exit hole of the beehive shelf. The hard glass or iron tubing should have some iron filings or some tacks placed in it before being corked up, and should be so fixed as to permit of considerable test being applied thereto. A Ramsay burner, where such is available, will perform the double office of support and heater admirably. For further particulars as to the fitting up of this apparatus, see Cartwright's "*Section One*" *Physiography*, p. 149. The gas that comes over first of all is to be rejected. Ask children why. After the gas has bubbled over for a minute or so, apply a light to one of the jars, and compare what happens with the phenomena observed when the gas got from water by means of sodium was examined. The two cases are identical, and it is safe to assert that the iron has set free inflammable gas from water just as did sodium. Fill two or three jars with hydrogen, and proceed to perform the following experiments:—Hold a jar filled with the gas, with the bottom just slightly inclined downwards from the horizontal, so that the mouth may tilt slightly upwards. Place the mouth of an empty jar vertically, with the mouth downwards, in such wise that the lip may touch the uppermost lip of the horizontal jar. After the lapse of a minute or so apply a light to the mouth of the vertical jar. What does this teach with respect to the density of the inflammable gas? Or make some soap-bubbles by placing the delivery-tube from the gun-barrel in a soap solution, and, as the bubbles rise, apply a light to them. Or fill a collodion balloon with the gas, and observe how quickly the balloon rises. Compare the filling of an ordinary balloon with this, and explain that sometimes inflammable gas is used to fill balloons, although more often this is done with coal gas, which contains a very large proportion of the gas that we have obtained from water. The lightness of the gas and its inflammability are its most characteristic features.

What is formed when Inflammable Gas burns?—To answer this question we will prepare the gas by another method, which may easily be brought home to the understanding of every child by providing each with a test-tube containing a little acid, either hydrochloric or dilute sulphuric, and by placing in some of the test-tubes a piece of iron, in others a granule of zinc, and in others a little magnesium. The immediate fizzing, or effervescence, will show that a gas is coming off; and if the thumb is held loosely over the mouth of the test-tube, sufficient gas will be imprisoned to show that we have again got inflammable gas, since, when the mouth of the test-tube is brought near a gas jet, we again have the characteristic explosion and burning.

To burn the Gas in Bulk.—Fit up a flask with a thistle funnel and an L-shaped piece of glass tubing, the end of which has been drawn out to form a jet. In the flask place about fifty grams of zinc, and pour down the thistle funnel sufficient dilute sulphuric acid to cause a brisk evolution of the gas. Place a test-tube over this jet, and, after it has filled with the gas, burn the gas, and do this again and again until the gas burns quietly without any explosion, when the gas may be lit at the jet itself. Place the bulb of a glass retort so that the flame of the burning gas will just impinge upon it, and arrange for a stream of cold water to run through the tubulure of the retort and away by the beak, in order to keep the bulb constantly cold. Drops of a liquid will soon be seen to form on the bottom of the bulb of the retort. Place a beaker underneath, so that these drops may be caught as they fall, and continue the experiment until 10 or 20 c.c. of the liquid have been caught, acid being poured in from time to time to keep the current of gas continuous. The liquid thus obtained is to be very carefully examined. A measured volume should be weighed in a counterpoised test-tube. Then the whole of the liquid should be placed in a freezing mixture, and the temperature of freezing should be obtained by placing a thermometer in the test-tube, as in the preliminary experiments referred to at the commencement of this lesson. After this has been done, the liquid should be boiled, the boiling point being carefully ascertained. The liquid will be found to have the same density, the same freezing point, and the same boiling point as water, which may be taken as a strict proof that the liquid resulting from the burning of inflammable gas in air *is* water. Hence the gas has been aptly named the water-forming gas, or hydrogen, from the Gr. *hudor*, water, and *gennao*, I produce; and this is the name by which it is now universally known, although inflammable air was the name given to the gas by Cavendish, who first discovered it in 1766. It was the great French chemist Lavoisier who first of all got hydrogen from water by means of red-hot iron, and he it was who gave it the appropriate name that it now bears.

Electrolysis of Water.—This is one of the few experiments that cannot be performed by the class, but must be done by the teacher himself. The apparatus, of which there are many varieties, is called a voltameter, after Volta, the discoverer of current electricity, because it is by the agency of electricity that the water is to be broken up into its constituent parts. The teacher may purchase an apparatus if funds are at hand, when he will do well to get a Hoffmann. But there is no need to go to the expense of buying one, as it is quite easy to make a serviceable voltameter with a wide bottle, two pieces of platinum wire, the same number of pieces of platinum foil about two inches by one inch, and a cork bored to carry two pieces of glass tubing. The bottom of the bottle is first broken off by the following device:—A scratch is made all the way round with a file at the place where it is wished to fracture the glass. This scratch is touched with a piece of red-hot iron wire, when a crack will be developed, which will follow all the way round if the wire is heated from time to time. Having prepared the bottle, we next fit the cork into the neck, and place therein the two pieces of glass tubing, which are drawn out to a point at each end. Through these glass tubes run the two pieces of platinum wire, which must be long enough to extend two or three inches above and below the ends of the tubes, into which the wires are then sealed. The pieces of platinum foil are either welded on to the wires, or, better still, the wires are threaded through some half-dozen holes that have been made in the foil for this very purpose, the aim being to secure good contact between the foil and the wire. A wide test-tube is now placed over the foil, and the ends of the wires outside the bottle are fitted to three or four Bunsen cells. It now remains to pour some water into the inverted bottle, and to fill the two test-tubes (which should be of the same size) with water.

Before setting the cells in action and joining up, a little sulphuric acid should be placed in the water, as it is not possible for the current to decompose water that has not been thus acidulated. When all this has been done, it will not be long before bubbles of gas rise up the test-tubes, and the action is allowed to continue until there is a sufficiency of gas to permit of its being tested, which is done as follows: The thumb is placed over the mouth of the test-tube containing the greater amount of gas, and a lighted taper is placed at the mouth, when the thumb is removed, after the test-tube has been taken from the voltameter. A glowing splinter of wood is placed in the other test-tube, after it has been removed in a similar way. Thus it is made clear that water is composed of oxygen and hydrogen, the latter gas being present in double the volume of the former. It will be found possible to get the children to supply most of the foregoing information themselves as the experiment progresses, and, of course, every effort should be made to encourage this self-teaching.

KINDERGARTEN GIFTS AND OCCUPATIONS IN AN ELEMENTARY SCHOOL.

BY A PRACTICAL TEACHER OF INFANTS.

Introductory.

IN offering this paper to the readers of THE PRACTICAL TEACHER, I have been actuated by the idea that the notes which have proved so useful in conducting my own school may be of interest and value to other head teachers of infants' schools. I may say that we have had the entire good opinion of our Inspector since the school was opened in 1898.

Perhaps it would be better for the perfect understanding of the paper if I explain what I mean by the term "central idea" as used in the first note. Each week the whole of the teaching is grouped round some one subject, usually connected with the seasons. This subject serves as a peg on which to hang one's ideas, and also as a band to fasten and connect the work into a whole. Story, nature lessons, game, recitation, occupations, reading, and writing are all made to throw new lights on this "central idea," so that the information gained may come to stay, and also be full, clear, and precise.

Uses of the Occupations.

In using these occupations, finished perfection in the objects made should not be the primary aim, though, needless to say, no slovenly work must be passed.

The chief uses of the Gifts and Occupations in an elementary school are as follows:—

I. *To throw light on the central ideas of the work; to help the children to clear, well-defined knowledge about the things that come under their notice.*

How much more exact and full a child's knowledge of a daffodil will be, for instance, when he has planted it and watched it grow, modelled the bulb in clay, drawn its lance-shaped leaves, painted its flowers in the two shades of gold, and drawn the various parts of the blossom, than if he had only had a lesson on the subject. The nature lesson supplies him with the outline picture, but by means of his occupations he fills in the details by degrees until it becomes living and vivid, and glows clear, full, and well-defined upon the canvas of his mind.

This shows us that our occupations cannot be chosen arbitrarily. It shows us, too, that we cannot rigidly set down certain occupations for certain classes, for what is perfectly suitable for one week's lessons may not do for the next. Among the most fertile of occupations are drawing and clay modelling. These lend themselves to illustrate almost any subject, and, because of their great adaptability, they should have a place in the work of every class in a good school.

Thus an occupation should be chosen because it will throw the best and clearest light on the subject in hand. At the same time the importance of grading must not be overlooked. Every exercise must be on a level with the child's strength and capability.

II. Another very important use is *to give accurate notions of form and colour.*

It is of primary importance that children's notions of colour should be clear. Upon this depends much that is harmonious or otherwise in their after surroundings. A child's taste is naturally crude; brightness and brilliancy are the first things that attract him. From this stage we wish to lead him to an appreciation of artistic and delicate shades, to teach what colours will blend and which will clash. When teaching colour, therefore, great care should be taken that the shades used for demonstration are pure and exact in tone. Set colour lessons are not, as a rule, necessary. The ordinary Gift and Occupation work, with a little innovation in the way of ribbons, silks, paints, crayons, and colour charts, provide ample materials and opportunities.

In the same way the notions of form should be gained from the concrete example. Touch quite as much as sight—if not more so—imparts the ideas of form. Let the children handle objects, and pass their little fingers along the sides to measure their relative lengths, to feel the corners, or absence of corners.

It is a good plan to let a little child shut his eyes, and describe an object as fully as he can by means of the sensations given by touch alone. It is very important, in form-making with sticks, rings, laths, papers, or pencil, that exactness should be insisted upon, or the child's ideas are apt to become loose and distorted. In drawing, lines must be straight, *really* the shortest distance between two points; corners must be exact, and curves well-balanced. Hand training and eye training must accompany each other. Children should also learn to recognise the lines forming objects, as circles, ovals, rectilinear figures, or parts of these. Thus, leaves are more or less oval-shaped, flowers generally circular, stems roughly cylindrical, and so with most forms. This will greatly improve the drawing.

III. The third use is *to give deftness and accuracy to the fingers, and a corresponding precision to the mind.*

Here again we must look to our grading, and not expect a child to paint in the stipules of a rose-leaf before he can build accurately with Gift III. Froebel fully understood this when he arranged his system of Gifts and Occupations. He began with ball-plays, which required the baby hand just to *hold* the plaything. It is the hand as a whole that is used, and not the fingers, which as yet are too weak and untrained to act alone.

Gifts I. and II. deal mostly with the training of the hand as a whole. With Gift III. begins the training of the fingers. With the fingers the cubes must be taken up and accurately placed. Gifts IV., V., and VI. demand increasing delicacy of handling and dexterity. So on throughout the whole gamut of the Gifts and Occupations, in the order dictated by Froebel. After the blocks of various shapes and sizes come the sticks and rings, which train the extreme tips of the fingers. By-and-by come drawing, paper folding and cutting, clay modelling, and brush-work, all of which require delicacy of touch and great manipulatory power. Thus, by graduated, skilful, and careful training, the child's fingers become his servants.

These carefully cultivated habits of precision of touch induce habits of mental and moral precision and rectitude. Can we overestimate the value of moral exactness? So much depends upon it! Let a child gain loose moral ideas, and evil results are sure to follow.

IV. Another truly Froebelian use is *to provide children with material with which they can express their own ideas.*

This leads us on to the subject of individuality, which is one of the greatest importance. We do not wish to turn children out, as though by machinery, all after the same pattern. Every child has a bent in one direction or another, and it should be our care to try to discover it, and then by exercise to train it.

If children are never given a free hand with their material, individuality often remains a sealed chapter. But at the end of every occupation, a little time—just a few minutes—should be given to letting the children make "what they like." This remark cannot apply to occupations like embroidery, or rug-work, or string-winding; but in the most common occupations, such as clay modelling, drawing, and paper folding or cutting, it can easily be done. In building, every lesson should end with a few minutes for free construction. In drawing especially, children will design beautifully symmetrical patterns. This original work is of great advantage to the teacher, for it gives her opportunity to correct faults which pattern-work might not have shown up, such as wrong proportion, incorrect observation, imperfect vision, or lack of detail.

Occupation lessons should also be lessons in *verbal* self-expression. Little children find it very difficult sometimes

to put their ideas into words; but if word and action accompany one another, and the children are encouraged to speak about what they are making, and ask questions, language will be much strengthened. Needless to say, grammatical errors should never pass unnoticed.

V. Again, these lessons should be used *to teach self-reliance and prompt obedience.*

Many people complain that the "kindergarten child"—with a great stress of contempt on the adjective—can do nothing by himself. It should not be so, but rather the opposite. One great use of the occupations in the hands of a skilful teacher and trainer is to make the children self-reliant; and the great rule here is, "Never perform the child's task for him." Guide and suggest, but never let the result on the child's work be yours, but his own. Far better the latter, if ever so imperfect, for the former is absolutely valueless. Teachers sometimes go round and put a brick in its right place, or draw a difficult line for a child. This is of no value to the child himself. He will learn to lean on you, and be quite helpless when left to himself. Let your directions be given slowly, distinctly, and unmistakably, and let the child carry them out.

Attention to directions will bring about obedience. As far as kindergarten work goes, disobedience usually brings its own punishment, and it does no harm to let a child who is prone to disobey find this out by experiment. Never mind if he spoils a little material in learning his lesson. After all, it is result to the child, and not to the material, that we trouble about. In paper-cutting, for instance, a child is in too much hurry to cut, and his horse is decapitated or deprived of its caudal appendage. His picture is spoiled. It would be a fatal mistake to give him another piece of paper. Let the natural punishment operate and bring its own disappointment. He will be more careful next time; his mutilated horse will have taught him a lesson. In all such cases inattention and disobedience surely bring their own punishment. The child learns to put aside his own wishes, and gradually becomes self-disciplined. It is a good plan to give commands only once, and to let them be quite simple and direct.

VI. The great æsthetic use is *to give children a love of the beautiful.*

We pity people who have no appreciation of the beauty spread around us so lavishly in the works of Nature; and rightly so, for they miss a great deal of pleasure, and that of the highest kind. Some persons are so blind that they see no beauty in the symmetry of a design, the curves of a masterpiece in sculpture, or the delicate colouring of an old fresco. Emerson says, in speaking of the great refining characteristic of the perception of beauty, "We only see as deep as we live." So from the first we try to mould into the children's very lives the love of true beauty, so that they too "must needs love the highest when they see it." As this is our aim, the designs that they draw, the forms that they fold, must be quite symmetrical; the colours they employ must be pure and harmonious: they must be trained to see beauty of form or colour in even the humblest of Nature's works; and it is in the faithful reproduction of these that they attain to ideals of the most perfect beauty. The line of beauty is the curve, and when once the construction of this line has been mastered, beauty can be evolved in every design; but curves must be true, otherwise there is no beauty. The child must unconsciously learn the truth that "highest perfection is highest beauty."

Scheme of Work for the Spring Months, 1901.

Story.	Nature or Object Lesson.	Game, Song, or Recitation.	Kindergarten Occupations.
Spring and Her Helpers. The Maple Tree's Surprise. The Little Worm that was glad to be alive (*Child's World*). Angels Unawares. The Despised Bulb. What Good? (*Fables for Little Folk.*)	A Snowdrop Plant. The Coming of Spring. How Plants Live and Grow. A Primrose Plant. Kinds of Roots. Kinds of Stems. Kinds of Leaves. The Daffodil. The Bluebell. The Violet. The Cowslip. Germination of Seeds. Kinds of Flowers. Parts of a Flower.	**Recitations—** The Call of Spring (*Pickering*). The March Wind's Mission (*Pickering*). The Garden (*Chambers*). **Songs—** Spring Returns to Earth once more (*Original*). Spring is Here (*Child Life*). **Games—** The Spring Fairy (*Original*). Dainty Little Snowdrop (*Original*).	**Brush-work.**—Snowdrop plant, Daffodil plant, Primrose plant, Crocus, Bluebell, Violet, and Cowslip plants. **Clay Modelling.**—Bulbs, Carrots, Turnips, Onions, Radishes. **Drawing.**—Leaves of various plants, showing types. A perfect plant, showing parts. A flower in section, and separate drawings of the parts. Also drawings of flowers given for brush-work. **Work in the Garden.**—The children now plant the seeds in their garden, and watch how they grow. **Paper Cutting.**—Plants drawn by children from nature cut out and mounted in brown paper albums (Standard I.).
The Logging Camp. The Honest Woodman. Little Deeds of Kindness. Jack and Jenny Sparrow. Little Yellow Wing (*Child's World*). The Oak and the Honeysuckle. The Clever Builders (*Fables for Little Folk*). The Fir Tree. The Daisy (*Andersen*).	Woods in Spring. A Tree and its Parts. A Bird's Nest. The Uses of Trees. The Woodman. The Carpenter. Structure of a Bird. Classes of Birds. Birds' Beaks. Birds' Feet. The Cuckoo. The Skylark. Migratory Birds. The Swallow and Martin.	**Recitations—** Pussy Willow. The Tree (*Child's World*). The Boy and the Bird's Nest (*Chambers*). **Songs—** The Cuckoo (*Golden Boat*). The Trees (*Same source*). **Games—** Little Birdies (*Songs and Games for the Kindergarten*). Babes in the Wood (*Same*). Imitation Games—Trades. The Ship (*Songs and Games for the Kindergarten*).	**Brush-work.**—Leaves of trees showing different varieties of shape, margin, venation, etc. **Group-work.**—A wood with wild flowers growing, twigs and buds, catkins of various kinds. **Clay Modelling.**—A bird's nest and eggs. The woodman's, carpenter's, and gardener's tools. **Drawing.**—Beaks and feet of birds, an axe, a hammer, a wagon, a foot-rule, a ship. Also drawings of leaves, catkins, etc., as given for brushwork. **Paper Cutting and Mounting.**—Leaves of trees drawn from nature by the children, and then cut out and mounted (Standard I.). **Work in the Garden.**—Weeding and watering.

Nature walks are taken by all the children in classes during the greater part of the year. In them they collect various specimens for their work.

***** Schemes for the other Seasons will appear next month.**

The Choice of Occupations.

Though in our school any occupation may be used that is suited to the age of the children and their manipulatory power, the following are in general use:—

Babies—under four.
Gifts I., II., and III.; bead-threading; clay modelling; shell-laying (outlines of objects); colouring; sand drawing.

Class III.—aged four.
Gifts I., II., and III.; sand drawing; clay modelling; bead and reed work; free drawing (paper); stick-laying.

Class II.—aged five.
Gifts III. and IV.; clay modelling; drawing; Gifts III. and IV. combined; blob-work; tablet-laying; paper-folding.

Class I.—aged six.
Clay modelling; brush-work—blobs, leading to painting; paper-folding; drawing—freehand on paper, freearm on blackboards.

Standard I.
Clay modelling; brush-work—nature work; object paper cutting and mounting; sand modelling in connection with geography; drawing—freehand on paper, freearm on blackboards.

(*N.B.*—We use no slates; from the age of four the children all work on paper.)

Such occupations as embroidery, string-winding, paper flower making, tinsel-work, etc., are excluded, as being either mechanical or purely decorative. Mat-plaiting is used a little in the lower classes to give ideas of number.

NATURE LESSONS FOR INFANTS.

IV.—HOW PLANTS PROTECT THEMSELVES.

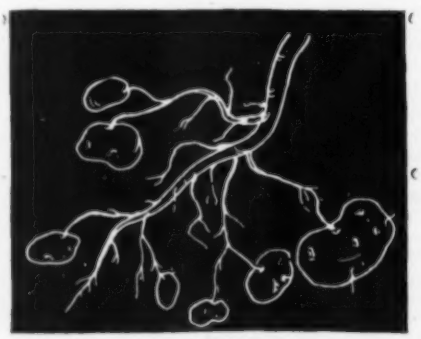
Illustrations.—Some chestnut buds and fruits, pieces of different kinds of bark, a turnip, a few nuts, some prunes, a dandelion root, holly, ivy, and laurel leaves, and a branch of fir, will be found useful for these lessons.

CHESTNUT BUD.

Introduction.—Even plants have their enemies—large animals that nibble their young stalks and leaves, and would like to eat the food stored by the plant for its own use in root, stem, and seed; also small creatures like the ant, which eat the pollen that is needed to make fruitful seeds come. The cold and frost of winter and early spring would prove enemies to the young buds of trees and plants if they were not protected from them; while a measure of protection is needed at all times of the year from the rain, which threatens to produce decay in various parts of plants.

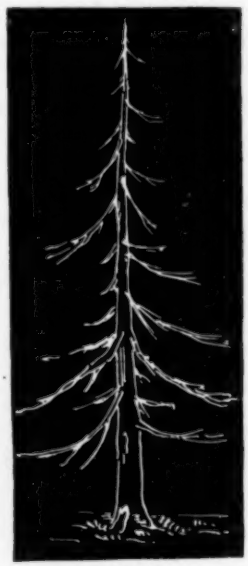
How Plants Protect their Food Stores.

Many plants attempt to take care of their winter stores of food by placing them under the bark. This is usually tough enough to prevent animals from biting through it, and so getting at the food. (Show pieces of different barks, and let children try to bite them.)



POTATO.

Unless, however, the plant is sufficiently big and strong to have a fairly *thick bark*, such creatures as rabbits and squirrels

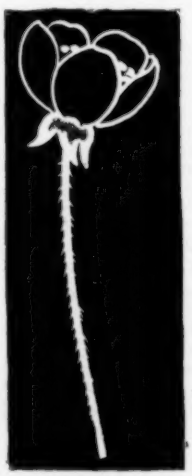


FIR TREE.

CARROT.

will nibble through it and steal the food underneath; so many plants adopt the plan of burying their stores underground *in roots* or *stems*, which serve as cupboards, or rather as cellars. (Let the class name some such cupboards, as turnips, carrots, onions, crocus stems, potatoes, the teacher drawing them on the blackboard as they are named.)

Even now they are not quite free from danger: pigs, for instance, will often try to find these stores when rooting about, and make many a good meal from them. To prevent danger of



BUTTERCUP.

LAUREL LEAF.

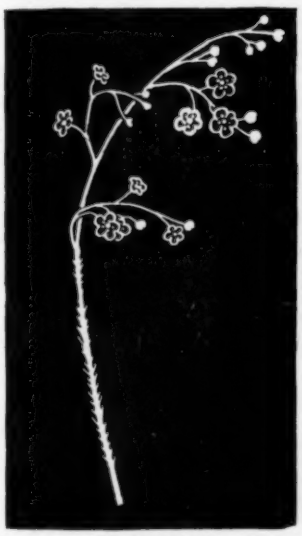
this kind, some cupboards are provided with *thick walls*, so that the food within cannot easily be reached. (Show a turnip; cut off a slice, and let children tell how the inside is protected.)

Yet another plan is to develop a *poisonous* or at least a *disagreeable juice*, so that animals may not like its taste, and so leave it alone. (Show dandelion root; break off a piece; let children taste the juice which comes out, and see how bitter it is. Press out more juice, and watch it gradually harden till it makes a kind of thick glue. Draw from the class how unpleasant this would be in the mouth of any animal that had gnawed into it.)

Besides the food which is stored by a plant for its own use, there is the food stored in the *seed* for the future use of the tiny plant within it. These supplies of food are protected even more carefully than those of which we have been thinking. What creature would like to nibble a prickly chestnut burr? What sharp teeth and strong jaws are needed to crack nut-shells! How difficult it is to get at the kernel inside the stone of a plum or a cherry! (Show these, and let children name other seeds, and say how the food within them is protected.)

How Plants are Protected from Cold, Rain, and Snow.

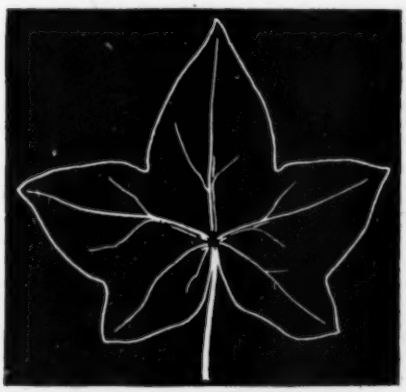
Buds.—Little delicate leaves need great care while they are young, just as babies always need to be more warmly covered than big children. Some plants put a soft woollen cover all over each baby leaf; then, as they are all cuddled closely together, little brown coats are put over them to keep out all cold; last of all, they are covered with a sticky layer of varnish, so that no rain may get in. (Show some chestnut buds; let children feel the sticky outside. Let one child pour a little water on a varnished desk and on a piece of plain deal, and note how it runs off the desk at once, but sinks into the deal. Remove the scales from the bud, and let children examine the woolly leaves.)



LONDON PRIDE.

Fruits.—The waxy bloom on plums and grapes, and the tough, shiny skin of apples, act in the same way as the varnish—as a protection from wet.

Leaves and Branches.—Evergreen leaves need far more protection against cold and wet than other leaves. We accordingly find that they are all tough in texture, shiny on surface, and so shaped that rain can easily fall off them. (Show holly, ivy, and laurel leaves.)



IVY LEAF.

The fir tree grows in large numbers in cold countries where there are frequent and heavy falls of snow. It is wonderfully formed to prevent it from being injured by them. The branches slope downwards a little, instead of upwards or straight out; so the snow falls off almost at once, otherwise the branches would break with the weight of snow. (Show branch with leaves, and draw fir tree on blackboard to show slope of branches.)

How Plants Protect Themselves from Creeping Insects.

Many plants require to be visited by some kind of flying insects, such as bees, and for this purpose they make honey, and do other things to attract them. But without some protection this honey would be stolen by creeping insects like ants, which do no good to the plant; so we find a number of plans to prevent this. The flower-stalks of many plants are covered with hairs, which act as a kind of railing to keep off ants; while in some cases the hairs on the stem are tipped with little balls of sticky juice. (Draw a piece of London pride, showing the hairs.)

LILY BULB.

Some flowers, like the buttercup, besides having hairy stalks, turn back the little leaves of the calyx as soon as the flower opens, so making a sort of lobster-pot in which to catch any insect that has managed to get through the rails. (Draw a buttercup with calyx turned back.)

In these lessons we have discussed only a few of the very many wonderful ways in which nature protects both animals and plants from their enemies; but even little children can find out others for themselves when out for walks in the country, in the parks, and in the city streets.

OUR SCHOLARSHIP COURSE.

(*Continued from page 472.*)

(5.) Tasmania.
- (*a*) Horses, 31,000; cattle, 160,000; sheep, 1,700,000; pigs, 74,000.
- (*b*) Tin, silver, copper, iron, and coal.
- (*c*) Timber, wheat, fruits (apples, etc.).

(6.) Western Australia.
- (*a*) Horses, 70,000; cattle, 300,000; sheep, 2½ millions; pigs, 60,000.
- (*b*) Gold, tin, lead, etc. (richest gold mines).
- (*c*) Timber, cereals, fruit, wine, etc.

The following productions should be noted:—
Pearl shells (W.A.), sandal-wood, tortoise-shell, bêche-de-mer (for the Chinese market), jarrah wood.

Note the important influence which the process of *freezing* cargoes has had.

Chief shipping lines—Peninsular and Oriental, Orient, Messageries Maritimes, and North German Lloyd.

Times taken by mails—Sydney, 35 days; Melbourne, 32 days; Brisbane, 44 days; Hobart, 36 to 40 days; Adelaide, 30 days.

2. *English.*—A careful classification of the pronouns must be learned. Distinguish reflexive and emphatic pronouns. Note the reciprocals. Be quite clear as to the difference between *my* and *mine*, etc. In the *Julius Cæsar*, read to understand and *enjoy* before attempting parsing, analysis, etc. Send up all difficulties for solution.

3. *History.*—The chief points in these reigns are given in the Pupil Teachers' Course this month and last month. Edward's legal reforms are most important.

The following questions will serve as a guide:—

(1.) Compare Henry the Second and Edward the First with regard to—
- (*a*) Extending the dominions of the Crown.
- (*b*) The administration of justice.
- (*c*) Relations with the clergy.

(2.) Give a short biography of Edward the First.

(3.) Mention causes in this period which produced distress and vagrancy, and any measures taken to meet these evils.

(4.) What was the chief claim of Edward the Third to the crown of France? Give the chief events of the war founded on that claim from 1340 to 1360.

(5.) Trace the relations between England and Scotland during the following epoch: Edward the First to Edward the Third.

(6.) What great religious movement took place in the reign of Edward the Third?

(7.) Say what you can of Edward the First's legal reforms.

(8.) Say what you can of the causes and results of the Villeins' Revolt.

4. *Arithmetic.*—The theory of decimals must be carefully prepared. It is well and fully treated in Christian and Collar. The following points especially demand attention:—

(1.) What vulgar fractions can be exactly expressed as decimals, and why?

(2.) How can you tell the limit of the number of recurring figures—for example, in $\frac{1}{13}$ or $\frac{1}{17}$?

(3.) The various decimals obtained by reducing *sevenths* and *thirteenths* to decimals (most important).

(4.) Addition, subtraction, multiplication, and division of recurring decimals *without* reducing to vulgar fractions.

OUR TUTORIAL SECTION

OUR PUPIL TEACHERS' AND SCHOLARSHIP COURSE.

BY ARTHUR T. FLUX,

Principal of the Belvedere Pupil Teachers' Centre, First on Scholarship List; Author of "Scholarship School Management," "Building of the British Empire," etc.

SPRING EXAMINATION, 1901.

Eleventh Month—March.

WORK TO BE PREPARED.

1. ENGLISH.

Revise generally. Candidates must make quite sure of all suffixes, first year pupil teachers of all prefixes, second year pupil teachers of history of the language, and common mistakes in the spoken and written language.

2. HISTORY.

Candidates.—George IV., William IV., and Victoria.
First Year.—Revise up to 1400.
Second Year.—Finish the reign of Victoria.

3. GEOGRAPHY.

General revision. Practise likely maps. Make quite sure of industries, towns, and governments.

4. ARITHMETIC.

Look up the theory of all rules, and work any problems, etc., on the year's work.

5. EUCLID.

First Year.—Revise Props. 21–26, with ten deductions per week.
Second Year.—Revise Props. 4–48, with ten deductions per week.

Notes on Special History—(continued).

1775. The success at Lexington emboldened a party of New Englanders, under Ethan and Allen, to make an attack on Canada by way of the Hudson Valley, Lakes George and Champlain, under the impression that Canada would join them in throwing off the English yoke. Ticonderoga and Crown Point were seized; but neither at this time nor at any subsequent period of the struggle did the French Canadians show any desire to share in the revolt. The reasons are not far to seek. It was indeed bad to change from Catholic France to Protestant England, but it would have been far worse to be under the domination of the intolerant Puritans of New England. The British Government had treated the French Canadians well. Their laws, customs, and religion were left untouched; their priests were not interfered with; and they really had no grievance against their conquerors.

A second congress of delegates from the States was held in May at Philadelphia, and decided to reject Lord North's proposals. A national name was assumed—the United Colonies—and a commander-in-chief chosen. The man selected was George Washington of Virginia—a man of much repute in his own state, and probably the only man who was capable of holding together the various factions of which the colonial army was composed.

Before he arrived to take command, another action had been fought. There are two hills just outside Boston on the north—Breed's and Bunker's Hills. The colonists seized these hills, and repulsed an attempt by Gage to carry them. Meanwhile the States had sent a petition—the Olive Branch Petition—to the government; but as it came from Congress, a body which the government could not recognise, it was productive of no good result, except perhaps that it threw the onus of the struggle on the British.

Another attack was made on Canada. General Montgomery led a force by the natural route mentioned above to Montreal, which he took. Carleton, the English general, had no force at his disposal to repel the invasion, and so shut himself up in Quebec. This the Americans could not take, and on the death of their leader, Montgomery, they withdrew to Lake Champlain.

Washington was pressing Howe (who had succeeded Clinton) at Boston. The British Government hired troops from Brunswick and Hesse, since they could spare no soldiers from home.

1776. Howe decided to retire to Halifax to await these reinforcements; and when they arrived he moved to Sandy Hook, thus threatening New York, while at the same time General Clinton carried a force against Charleston in Carolina. The colonists were in a state of considerable depression at this time. The continued war had, of course, ruined all trade, they were not a rich people, and they were confronted by a much superior army. Some of the more moderate were inclined to give in, and to prevent all such divisions of opinion, Congress in 1776 passed the Declaration of Independence, cutting off all relations with England and making their country independent.

The English troops defeated the colonials at Brooklyn (August), and occupied New York; but Howe failed to follow up his success. Congress proceeded to raise eighty-eight battalions of seven hundred and fifty men each to take the place of the militia, who had hitherto been their only fighting force.

Washington was compelled to fall back beyond the Delaware, and Congress moved its seat to Baltimore.

Early in the year the expedition which had gone south destroyed Norfolk, the wealthiest town in Virginia, but failed (June) in their attacks on Charleston.

On Christmas Day Washington crossed the Delaware, and drove the British out of Trenton.

1777. Early in the year he recovered nearly all the ground between the Delaware and the Hudson.

Howe's plan of operations for the year was threefold:—

1. He was to take an army by sea to capture Philadelphia.

2. A part of the army under Clinton was to remain in front of New York to check Washington.

3. General Burgoyne was to bring a force from Canada, and joining hands with Clinton, cut off the New England States from the rest.

We will consider each campaign separately.

1. Howe did as he planned—won an action at Brandywine Creek, and took Philadelphia. Washington attacked a part of the army at Germanstown, but was defeated, and withdrew into winter quarters at Valley Forge, a wild and very strong position on the Schuylkill River, twenty miles from Philadelphia.

2. Clinton, though obtaining some trivial successes, could do nothing from New York.

3. Burgoyne marched south from Canada, and took Ticonderoga, but was checked at Bennington and Stillwater. He attempted to effect a union with Clinton, but only succeeded in getting as far as Saratoga. Here he was stopped by General Schuyler and 16,000 men. The country rose behind him, and he could neither advance nor retreat, and was compelled to surrender with all his force. It was promised that his troops should be sent to England under parole not to fight again during the war, but this promise was not kept.

This success cheered the colonists, who were sadly in need of some stimulus. Washington utilised his stay at Valley Forge to reorganise and equip his army—a thing which was sadly needed, for the men were destitute of good boots, clothing, ammunition, and weapons. It was during this period that Washington's character shone out conspicuously as a patient, encouraging, tactful man.

At home, the wisest politicians were urging the government to yield all the demands of the colonists, excepting that of independence. Pitt (Earl of Chatham) raised his voice in favour of justice and equity, but the king and his ministers pursued their way in a blind and blundering fashion.

1778. Howe was recalled at his own request, and Clinton took the chief command in January. In the following month the French made an alliance with the colonists. Their motive was, not that they approved of the principles for which the colonists were fighting—"no taxation without representation," for that was unknown in France—but because it was too good a chance to be lost of paying off old scores. The English had deprived them of Canada; here was a chance to deprive England of her colonies. Their action recoiled on their own heads, for the success of the United States undoubtedly helped forward the French Revolution.

The news of this new enemy led to a change of plan in America. The British forces were concentrated at New York, in view of a possible French invasion, and Philadelphia was abandoned. A joint attack by French and Americans failed; and the French admiral, D'Estaing, sailed away first to Canada, where he unsuccessfully attempted to raise the Canadians, and then to the West Indies.

Georgia was occupied by a force sent from New York, but otherwise little fighting took place. Yet the French alliance helped the colonists, for it held the hand of England. No additional forces could be sent, and efforts could not be concentrated on reducing the colonies.

1779. In this year Spain joined France, and Gibraltar was besieged for four years. Little fighting took place in America. The English successfully held the south, and also destroyed the Massuchusetts fleet in Penobscot Bay.

1780. The British captured Charleston, and the French sent 6,000 men to Newport. In September occurred the "André" incident. General Arnold, an American, who held Westport, was secretly negotiating with Clinton to yield that place into British hands and transfer his services to the Crown. Messages were sent by Major André, who had Clinton's command not to enter the American lines and not to take off his uniform. Unfortunately, he was persuaded to do both, and was captured, and, notwithstanding every remonstrance by Clinton, was hanged by Washington as a spy.

In December Holland declared war against us.

1781. Lord Cornwallis, who commanded in the south, proposed to march north, through Carolina and Virginia, and effect a junction with Clinton. He succeeded in clearing the whole of North Carolina, but was checked at Guildford, and fell back on Wilmington, thus allowing the Americans to recapture the whole of the south. Cornwallis advanced northward, and finding his way barred, threw himself into Yorktown, on a spur of land in the York River, to await reinforcements by sea from Clinton. Washington rapidly gathered a strong force against him, and by vigorous attacks compelled him to surrender (October 17).

This virtually closed the war.

1782. In this year we lost Minorca, Rodney defeated De Grasse in the West Indies by breaking through his line of battle, and a tremendous attack on Gibraltar was successfully repulsed.

Preliminary articles of peace were signed.

1783. The treaty of Versailles ended the war.

1. The independence of the colonies recognised.
2. Florida and Minorca ceded to Spain. Gibraltar retained by Great Britain, and the right of cutting logwood in Honduras Bay ceded.
3. The islands of St. Pierre and Miquelon, St. Lucia and Tobago, and Senegal restored or ceded to France.

A few notes on the results of the war will be given next month.

A collection of questions for revision will also be given next month.

Test Examination.

The following questions should be answered under examination conditions, and in the specified time.

If desired, the papers will be marked, criticised, and returned. Any pupil teachers willing to avail themselves of this offer should send papers as soon as possible to Mr. A. T. Flux, The Bays, Belvedere, Kent, together with a postal order for two shillings.

Candidates.

Arithmetic.

(1 hour. Answer three questions, including the first if you can.)

1. Multiply 729 by 365. (You then have six lines of figures.) What results do you obtain if (*a*) you subtract the *first* line from the *last*; (*b*) you subtract the *third* from the *fourth*; (*c*) you add the third line to the sixth?

Of which lines is 81 a factor? Of which 73?

If a man's income is £3, 0s. 9d. a day, how many pence is that per annum?

2. Divide £3, 7s. 10½d. by $\frac{7}{8}$; and divide 17 tons 13 cwt. 2 qrs. 27 lbs. 15 oz. by 37.

3. Simplify $\dfrac{\frac{3}{5}\text{ of }\frac{5}{7} + 13\frac{1}{3}\frac{1}{5}}{13\frac{1}{4}\frac{3}{2} + \frac{1}{17} \times \frac{5}{6}\frac{1}{1}} \times \dfrac{\cdot 857142}{\cdot 428571}$ of 2s. 6½d.

4. Express £3, 17s. 10½d. as a decimal of £1, and 17 cwt. 3 qrs. 24 lbs. 8 oz. as the decimal of 1 ton, by practice method if you can.

5. Find the total value of $18\frac{1}{1}\frac{3}{9}$ score at £2, 13s. 3½d. each, and $31\frac{7}{1}\frac{}{9}$ dozen at £2, 6s. 8½d. each.

Elementary Science.

(¾ hour. Answer three questions.)

1. How would you find the specific gravity of (1) a solid; (2) a liquid? Answer fully.

2. Two iron bars of equal length and thickness are fastened together, without overlapping, so as to make a figure in the shape T. Where is the centre of gravity?

3. Weights of 18 ounces and 7 ounces are joined by a thread which passes over a fixed pulley. The larger weight rests on a table at a point underneath the pulley; the smaller weight hangs in air. What is the pressure (1) on the table; (2) on the pulley?

4. Packages are placed on the racks in a railway carriage. From which side are they likely to fall (*a*) when the train starts; (*b*) when it stops?

Music.

(15 minutes. Answer three questions.)

1. What other groups of contiguous scale-tones are separated by the same intervals as **d r m f s || l_1 t_1 d r m**?

2. Name the intervals **f–l**, **s–d'**, **r–d'**, **m–t**, **t_1–f**.

3. Write over each note and rest in the following its value in pulses or fractions of a pulse:—

| m :d.m:s | f :-.m:r | m :- : | s :-.t_1:d ||

History.

(¾ hour. Answer three questions, including the first if you can.)

1. Say what you can of the origin and results of the Wars of the Roses.

2. When, where, between whom, and with what results were the following battles fought:—Agincourt, Flodden, Marston Moor, Blenheim, Lewes?

3. Give some account of any three of the following:—Hubert de Burgh, Protector Somerset, Raleigh, Marlborough, Cromwell.

4. How did Scotland become united to England (*a*) under one crown; (*b*) under one parliament?

5. Say what you can of the following:—Mad Parliament, Long Parliament, Whigs and Tories, Hampton Court Conference, Trial of the Seven Bishops.

Geography.

(¾ hour. Answer three questions.)

1. What districts in the British Isles are connected with the production of corn, fruit, cattle, cheese? Name the chief market towns and ports of each district.

2. Mention some facts interesting to children connected with the Peak district, Norfolk Broads, Isle of Anglesey, Trossachs, Giant's Causeway.

3. Make a list of the chief islands round Great Britain, and say a few words about one.

4. Where and what are the following:—Dundee, Rathlin, Exmoor, New Forest, Wexford, Oban, Crinan?

5. Say what you can of the government of the British Isles.

English.

(¾ hour. Answer three questions.)

1. Analyse—

> "*If fight* King James—*as well* I trust
> That fight he *will*, and fight he *must*—
> The Lady Clare behind our lines
> *Shall tarry while* the battle joins."

2. Parse words in italics.

3. Give the meaning and use of the suffix in each of the following words:—likewise, visitor, maiden, landscape, brightest, wisdom.

4. Explain—

(*a*) "Won by my proofs, his falchion bright
This eve anew shall dub me knight."

(*b*) "Oh for one hour of Wallace wight,
Or well-skilled Bruce, to rule the fight."

5. Define Passive Voice, Infinitive Mood, Adverbial Object, and give examples from the poem.

Composition.

(30 minutes.)

Give in your own words the substance of Wilton's story, or describe, with a plan, the battle of Flodden.

First Year.

Arithmetic.

(1 hour. Answer three questions, including the first if you can.)

1. Define *measure* and *multiple*. Of how many numbers is 288 a multiple (omit 1 and 288)? What multiple of 357 is nearest to 10000, and by how much is it nearest? Find the G.C.M. of $\frac{3}{5}$, $\frac{9}{7}$, and $\frac{9}{1}\frac{}{5}$.

2. Find the missing term in each of the following, and explain the principle on which you work:—80 : ( ) :: 160 : 14; 287 : 372 :: ( ) : 5376; ( ) : 342 :: 58 : 12.

3. In what proportions must tea at 2s. 6d. per lb. be mixed with tea at 3s. 9d. per lb. to make a mixture worth 2s. 9d. per lb.?

4. Is travelling at 1s. per mile more or less expensive than travelling at 65 centimes per kilometre? (1 metre = 39·37 inches; 25 francs = £1.)

5. A man buys a farm of 120 acres for £3225. He repairs the buildings and lets it at 28s. per acre, thereby getting 3½ per cent. for his money. How much did he spend on repairs?

ENGLISH.

(¾ hour. Answer Question 1 and two others.)

1. Analyse the following, and parse words in italics:—

"*Though* my harsh touch, *faltering* still,
But mocked all time, and marred the dancer's skill,
Yet would the village praise my wondrous power,
And dance, *forgetful* of the noontide hour."

2. Explain—Famed Hydaspes; embosomed in the deep; my genius spreads her wings; one sink of level avarice; honour forms the social temper.

3. Give the derivation of the following:—subjected, artificial, transmit, freedom, melancholy, repair, solitudes, philosophic.

4. Give in your own words Goldsmith's description of Holland.

5. What is case? Mention the different kinds of case, and give an example of each, if possible from the poem.

COMPOSITION.

(30 minutes.)

What were Goldsmith's views on *Happiness*, or on *The Character of the English?*

HISTORY.

(¾ hour. Answer three questions, including the last if you can.)

1. What opposition had Richard the Third to face on his accession? How long did he reign?

2. Write a short account of any two of the following:—Warwick the King-maker, Sir Thomas More, Raleigh, Wolsey, Francis Drake.

3. What important events happened at Northallerton, Berkeley, Pontefract, Hexham, and Fotheringay?

4. Mention six statutes passed with regard to church affairs, and say what you can of one.

5. Give some account of social life in Tudor times.

GEOGRAPHY.

(¾ hour. Answer three questions, including the first if you can.)

1. Draw a sketch-map of India, putting in rivers and mountains, and Bombay, Calcutta, Madras, Lucknow, Lahore, and Patna.

2. What is the value to Russia of the Trans-Siberian Railway (*a*) commercially; (*b*) politically? What are the ports at the Pacific end of the line?

3. Describe the industries and chief towns of that part of Germany through which the Rhine flows.

4. Write fifteen or twenty lines on one of the following:—Chinese trade; Greece; Ceylon; lakes and inland seas of Asia.

5. Give the position of *four* of the following places, and mention any interesting facts about them:—Rangoon, Singaport, Leipzig, Lyons, Rheims, Florence, Moscow, Shanghai.

ELEMENTARY SCIENCE.

(¾ hour. Answer three questions.)

1. A bright vessel filled with ice is brought into a hot room. What result, besides the melting of the ice, will be observed? How do you explain the result in question?

2. One jar contains a pound of ice, and another a pound of ice-cold water. A pound of water at 90° C. is poured into each jar. What will be the temperature of each mixture, and how do you account for the difference?

3. A beam of light falls obliquely upon the surface of water. Draw a diagram to show the course of the reflected ray. What can you say about the brightness of the reflected ray (1) when the beam of light falls nearly perpendicularly on the water; (2) when it falls very obliquely?

4. Two things happen when a beam of sunlight passes through a prism; what are they? What result is obtained if the sunlight, before reaching the prism, has to pass through a piece of red glass?

5. Point out the changes in volume which occur when ice at − 10° C. is heated till nothing is left in the vessel.

MUSIC.

(15 minutes. Answer three questions.)

1. Rewrite the following, making a change to the first flat key at (*a*), and a return to the original at (*b*):—

(*a*) (*b*)
d s m s ta l s f ta l d' t r' d'.

2. Write the following intervals:—Major third above **ray**; imperfect fifth above **me**; perfect fifth above **te**; minor third above **fe**; major third above **ta**.

3. Rewrite the following in two-pulse measure, halving the value of each note and rest:—

s : −	m : d	m :-. r	d : −	f : s . f	m : s	r : −	− : −
l :	s :	f :	m :	s : −	f . m : r	d : −	− : − ‖

SECOND YEAR.

ARITHMETIC.

(1 hour. Answer three questions.)

1. It is a fact that if the numerator and denominator of a fraction are multiplied by the same number, the fraction is unaltered in value. Show how, by means of this fact, we can take $\frac{2}{7}$ from $\frac{9}{11}$.

Simplify, using any algebraic formula you like—

$$\frac{(\frac{9}{11} \text{ of } \frac{9}{11}) - (\frac{2}{7} \text{ of } \frac{2}{7})}{\frac{9}{11} + \frac{2}{7}}.$$

2. At what rate per cent. simple interest would a sum of money amount in ten years to as much as it amounts to in two years at 20 per cent. compound interest?

3. Find the length of the edge of a cube which cost £2703, 14s. 5½d. at 4s. 2d. per cubic inch.

4. A square pond whose side is 75 feet is girt with a path 2½ yards broad. Find the cost of asphalting this path at 9d. per square yard.

5. A man sells £39,300 4 per cent. stock at 132, and invests in another stock paying 2¾ per cent., whereby his income was diminished by £120 per annum. Find the price he paid for the latter stock (neglect brokerage).

HISTORY.

(¾ hour. Answer three questions, including the first if you can.)

1. Write a short essay on some of the advances made in the nineteenth century.

2. Give some account of any three of the following:—Blake, Judge Jeffreys, Addison, Admiral Byng, Wilberforce.

3. Give full particulars of *one* of the following:—The Solemn League and Covenant; the Septennial Act; the Chartists.

4. Say what you can of the Reform Bill.

5. Describe, with a plan, any great battle you have read of.

GEOGRAPHY.

(¾ hour. Answer three questions. More marks are assigned to No. 3 than to the others.)

1. Describe the plants and animals peculiar to South America *or* Australia.

2. Describe, with a sketch-map, a journey from Montreal to Vancouver.

3. Draw a sketch-map of South Africa, showing the various states of which it is composed.

4. What do you know about Tasmania *or* New Zealand?

5. Explain the following:—Pampas, selvas, karroo, ranching, ostrich farming. With what countries are the terms associated?

MUSIC.

(15 minutes. Answer three questions.)

1. Name the intervals formed by each of the following notes with the others:—**se t d' f'**.

2. Write out the following in three-pulse measure (the figures show pulses):—

1½	½	¾	¼	1½	½	1	1	1	1	½	¼	¼	2
s	m	d	m	s	l	s	f	rest	m	r	m	r	d.

3. Explain briefly the meanings of the following terms:—*Grazioso, piano, marcato, diminuendo, staccato.*

ENGLISH.

(¾ hour. Answer Question 1 and two others.)

1. Analyse the following, and parse words in italics:—

"We shall find of him
A shrewd contriver; and you know his means,
If he *improve* them, may well stretch *so far*
As to annoy us all; which *to prevent*,
Let Antony and Cæsar *fall* together."

2. Explain the following words and phrases:—To stale with ordinary oaths; hearts of controversy; promised forth; underlings; conceptions proper to myself.

3. Write a character of Cassius.

4. Explain clearly the relationship of the English language to others.

5. Correct the following, and give reasons:—

(1.) Friends am I with you all.
(2.) He is stronger than me.
(3.) I differ with you.
(4.) The heat was simply phenomenal.

Composition.

(½ hour.)

Give a brief summary of Antony's oration over the body of Cæsar; or write a brief essay on Australian Federation.

Elementary Science.

(¾ hour. Answer three questions.)

1. Mustard seeds are grown on wet flannel. After a time the plants are found to be heavier than the original seeds. How has this increase been obtained? Name the materials necessary for such increase.

2. What results may be observed when a piece of sodium is thrown into water? How do you account for the facts you describe?

3. A piece of marble is placed in a very hot fire for an hour or two. It is taken out and allowed to cool; then water is poured on it. What changes may be observed? What chemical actions accompany the changes in question?

4. Where are the magnetic poles, and where is the magnetic equator? How would you expect a dipping needle to behave if taken to these places?

5. Say all you can about hydrogen, its preparation and properties.

AUTUMN EXAMINATION, 1901.

Fifth Month.

Work to be Prepared.

1. Reading and Recitation.

Ten minutes' practice per diem, with due attention to emphasis, modulation, clear enunciation and pronunciation.

2. English.

Candidates.—*Marmion*, Canto vi., lines 444–568.
First Year.—*The Traveller*, lines 190–238, with twenty roots and meanings each week, or the derivation of all important words.
Second Year.—*Julius Cæsar*, Act iii., Scene 1.

Note.—Although the parsing and analysis will take up much time, the student must not confine his attention to these points alone. One or two questions are usually set on the grammar, and a collection should be made from the poem of illustrative examples of the more difficult points—for example, uses of the infinitive, nominative absolute, subjunctive mood, etc. The etymology must also be studied, candidates preparing thoroughly all affixes, first year pupil teachers all prefixes and important derivations, and second year pupil teachers the preceding and also the peculiarities to be found in *Julius Cæsar*. The latter are given at length in Moffatt's edition of the play. Figures of speech must be learned by all years, with examples of their use from the poem. The different poems must be studied as *literature*, and not merely as parsing exercises.

Composition.

Write one or two essays each week, selecting from the following:—*The Telescope; Fruit Trees; Habits of Domestic Animals; The Force of Example; Your Favourite Book; The Changes of Fortune.*

Give plenty of time and thought to this exercise; too much can hardly be given. Study the "Common Mistakes" in *Pupil Teacher's English Notebook*, and take care to avoid them.

3. History.

Candidates.—Henry IV. to Richard III.
First Year.—Edward III. to Richard II.
Second Year.—James II.

Notes.

Candidates.—The following points must be clearly understood:—

1. Henry's title. He was not the nearest heir, but he was not on that account a usurper. There was no law by which the nearest heir succeeded, although it was usual. The Parliament elected him king.

2. Henry owed his position—
   (a) To the support of the dignitaries of the Church; *therefore* he had to please it. Hence the passing of the Statute De Heretico Comburendo.
   (b) To the support of Parliament; *therefore* he had to yield to the demands of that body, and the Lancastrian period is noted for the advances made in the privileges of the Commons. They secured freedom of speech; redress of grievances before granting supplies; the right to control the public accounts; money grants not to be altered by the Lords.
   (c) To the nobles; hence their lack of loyalty and the risings against him—
      (1) In 1400, Earls of Huntingdon and Kent.
      (2) 1400–1410, Owen Glendower and the Percies.
      (3) 1407, Northumberland, Nottingham, and Archbishop Scrope.
      (4) 1408, Northumberland.

Henry the Fifth diverted the barons' attention from their own jealousies and quarrels by directing them against a common enemy—France. The French campaign must be thoroughly prepared.

Henry the Sixth is an illustration of what is often met with in history—a weak son following an able father.

The long minority and the squabbles among the leading barons, the loss of the French provinces, the heavy taxation, the character of his wife, all prejudiced the people against him, and led to the popularity of the Yorkist cause.

A genealogical table must be carefully prepared showing the descent of the Lancaster and Yorkist kings and the Beauforts.

The course of the wars; the results (decay of the Feudal System, etc.); Warwick the King-maker; Edward the Fourth, the brilliant and energetic soldier, but a vicious and indolent king; the ability of Richard the Third,—are points which must be carefully studied.

First Year.—See Notes for Candidates last month.

The Peasants' Revolt should be made the peg on which to hang a concise knowledge of the social life of the working classes since the Conquest. Reduced by the Norman supremacy to a state of serfdom, they had for centuries been regarded as little better than, if indeed as good as, the cattle of their owners. They lived in miserable huts on the plainest fare, and were clad in the commonest clothes. They laboured from sunrise to sunset, generally on the lords' lands, and sometimes on the strips of land allotted to them for their own use, where they grew enough corn, beans, and vegetables to keep them alive. Education, pleasures, aspirations, and ambition they had none. If they did succeed in producing more than was needed for their own consumption, and took this produce to market, the dues to be paid swallowed up all profits. From this state of suppression a variety of causes tended to emancipate them. The wars in France caused the manumission of many, and at the same time opened their eyes to their condition. The Black Death, by reducing the supply of labour in proportion to the demand, led to an endeavour to secure higher wages—a movement which the Statute of Labourers failed to suppress. Wycliffe's "poor preachers" added to his scheme of gospel teaching the propaganda of socialism on their own account, which they zealously taught wherever they went. The discontent at the loss of the French possessions, and the heavy taxes imposed upon the people, raised their discontent to the verge of insurrection, and the methods of the tax-gatherers led to the actual outbreak. Tyler was connected with it by a mere accident. Their grievances are shown by their demands—(1) the abolition of villenage, which was practically obtained; (2) the abolition of market tolls; and (3) rent of land to be fixed at fourpence an acre. The last was not very fair in the amount quoted, but it inaugurated the system of letting land on a money rental instead of personal service.

Second Year.—James II. Chief points:—

1. Rebellions (*a*) of Argyll and (*b*) Monmouth—the latter followed by the Bloody Assize.
2. Attempts of the king to rule by means of unjust judges and a standing army.
3. Declaration of Indulgence, 1687; renewed, 1688.
4. Subsequent arrest, trial, and acquittal of the bishops.
5. Invitation to William of Orange; landing of William; flight of James.
6. The Convention Parliament and the Declaration of Rights, which settled the points at issue between King and Parliament by limiting exactly the position and power of each.

4. Geography.

Candidates.—The remaining counties of England.
First Year.—Finish Europe.
Second Year.—Physical features, climate, and productions of North America.

Use maps for every detail to be learned. Analyse text-book and tabulate in notebook, and then commit to memory.

5. Arithmetic.

Candidates.—Addition, subtraction, multiplication, and division of decimals, their conversion to vulgar fractions and *vice versâ*.

Prepare the theory thoroughly. The rules governing the results of converting vulgar fractions to decimals must also be noted. Which fractions produce finite decimals, and why? Learn the following rule: "When the denominator of a fraction in its lowest terms contains no other factor than 2's and 5's, it may be represented as a finite decimal."

First Year.—Simple interest.

These sums must be worked by method of unity and *not* by formula.

Second Year.—Stocks and shares. Thoroughly master the terms employed, and distinguish carefully between *stock* and *money*.

6. Euclid and Algebra.

First Year.—Props. 13–16, and four deductions per week. Elementary factors and their uses.
Second Year.—Props. 43–48, with four deductions per week. Fractions generally.

A great deal depends upon a thorough grasp of algebraic factors. If this is not obtained, future work is increased tenfold.

The following factors are the A B C of the subject.

$(a + b)(a - b) = a^2 - b^2$.
$(a + b)^2 = a^2 + 2ab + b^2$.
$(a - b)^2 = a^2 - 2ab + b^2$.
$(a + b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$.
$(a - b)^3 = a^3 - 3a^2b + 3ab^2 - b^3$.
$(a + b)(a^2 - ab + b^2) = a^3 + b^3$.
$(a - b)(a^2 + ab + b^2) = a^3 - b^3$.

These must be thoroughly learned and understood, so as to be applied in any case with any letters.

Knowledge how to factorise a trinomial is also most useful.

The following are the four typical cases where there is no co-efficient to x^2:—

1. $x^2 + 5x + 6 = (x + 2)(x + 3)$.

Find two numbers which, multiplied together, give the third term, and, added, give the second. Both signs +.

2. $x^2 - 5x + 6 = (x - 2)(x - 3)$.

As above, *but* both signs −.

3. $x^2 - x - 6 = (x - 3)(x + 2)$.
4. $x^2 + x - 6 = (x + 3)(x - 2)$.

Find two numbers which, multiplied, give the third term, and, subtracted, give the second. One sign is +, one −.

Text-book will give exercises and fuller explanation.

7. Music.

General revision and working of back questions.

Test Questions.

1. *Penmanship.*
   Large Hand:—*The Philippine Islands.*
   Small Hand:—*Genius is the capacity for taking infinite pains.*
2. *English.—Candidates.*
   (*a*) Analyse lines 374–379.
   (*b*) Parse *must, no longer, foul fall him, first.*

First Year.
   (*a*) Paraphrase and analyse lines 175–185.
   (*b*) Parse *still, even, though, rear, deal, each wish contracting.*

Second Year.
   (*a*) Paraphrase and analyse—
   "Cowards die.....will come."
   (*b*) Parse *many times, but once, it seems, strange, seeing that, end.*

3. *History.—Candidates.*
   (*a*) Give some account of the later years of Edward the Third's reign.
   (*b*) Give the causes and results of the Peasants' Revolt.

First Year.
   (*a*) Say what you can of the conquest of Wales.
   (*b*) Mention the chief legal measures passed in the reign of Edward the First.

Second Year.
   (*a*) What was the Clarendon Code?
   (*b*) What was the Habeas Corpus Act? Explain clearly the danger to personal liberty which it removed.

4. *Geography.—Candidates.*
   (*a*) Say what you can of Lincolnshire. Give a sketch-map.
   (*b*) Describe a coasting voyage from Sunderland to London.

First Year.
   (*a*) Enumerate the chief ports on the Baltic, and say something of the trade of each. What has been done to render the entrance to the Baltic more easy?
   (*b*) Say what you can of the steppes, Black Lands, tundras, Crimea.

Second Year.
   (*a*) Give a brief account of our relations with Ashanti.
   (*b*) Mention the six chief British ports in Africa, giving their chief imports and exports.

SCHOLARSHIP EXAMINATION, 1901.

Third Month.

WORK TO BE PREPARED.

1. *Reading and Repetition.*—Ten minutes' practice daily. Do not neglect general reading of any standard literature.
2. *Penmanship.*—Ten minutes' daily practice (*Practical Teacher Copy Book*), with attention to the subject at all times.
3. *Dictation.*—One or two exercises per week.
4. *Theory of Teaching.*—Chap. iii., *Scholarship School Management.*
5. *Geography.*
   (*a*) Australia; physical features, climate, and productions.
   (*b*) Revise Spain and Portugal, Italy, Turkey, Greece, and the Balkan Peninsula.
6. *English.*
   (*a*) Grammar and syntax of the pronoun.
   (*b*) Twenty-five roots and meanings per week.
   (*c*) History of the language. The union of Norman French and Anglo-Saxon to form English.
   (*d*) *Julius Cæsar*, Act ii., Scene 1.
7. *History.*—Edward I. to Richard II.
8. *Composition.*—One or two essays each week, on such subjects as:—Proverbs; British Occupation of India—its Responsibilities and Results; Fresh Air; The Birth of the House of Commons; The late Queen; "Absence of occupation is not rest—a mind quite vacant is a mind distressed;" The character of any great person in history; The process of any manufacture.
9. *Arithmetic.*—Decimal fractions.
10. *Algebra.*—Simple equations, and problems thereon.
11. *Euclid.*—Book II., Props. 9–12, and four deductions each week.
12. *Elementary Science.*—Temperature; radiation, etc., of light.
13. *Languages.*
   Latin—Prepare pars. i. and ii., *Life of Epaminondas* (PRACTICAL TEACHER edition). Grammar and syntax of the adjective.
   French—Adjectives; number and gender. Four chapters from *Le Roi des Montagnes*, or equivalent amount from any other reader.
14. *Drawing.*—A freehand copy each week.
15. *Music.*—Chap. iii., *School Music Teacher.*
16. *Domestic Economy.*—Chaps. iv. and v., Nelson's *Domestic Economy.* (Treatment of slight wounds and accidents. Dress and materials used.)

Notes on the Work for the Month.

1. *Geography: Australia.*—Enter the following notes in note-book, and learn:—

Area—2,944,628 square miles (greatest length, east to west, 2,400 miles; greatest breadth, north to south, 1,971 miles).

Climate—Varies from tropical in the north to warm temperate in the south. Owing to the position of mountain chain, the interior is largely desert. The coast belt is fairly well watered. Droughts of frequent occurrence, the dangers arising therefrom being largely obviated by irrigation from the rivers and by boring artesian or deep-seated wells. (Of these there are 350 in Queensland alone, yielding 180 million gallons of water daily.) Hot winds from the interior, called brick-dusters, laden with fine sand, sometimes blow.

Productions—Animal: (*a*) *Native*—Kangaroo, opossum, wombat, bandicoot, porcupine, platypus. *Birds*—Black swan, emu, lyre-bird, apteryx, laughing-jackass, parrots, cockatoos, bower-bird, pigeons, etc. Lizards and snakes.
(*b*) *Imported*—Cattle, horses, sheep, pigs, goats, camels, rabbits (which from their numbers are a pest).
Vegetable: (*a*) *Native*—Eucalypti (or gum trees), such as iron bark, blue gum, stringy bark; acacia, beech, and pine.
(*b*) *Imported*—All European fruits and vegetables.
Minerals—Gold, silver, copper, tin, lead, iron, coal, antimony, cinnabar, etc.

Productions of the various states:—

(1.) New South Wales.
   (*a*) Horses, ¼ million; cattle, 2 millions; sheep, 43 millions; pigs, ½ million; 275 million lbs. of wool produced.
   (*b*) Gold, copper, silver, tin, iron, antimony, asbestos, cinnabar, kerosene, coal; small quantities of diamonds, rubies, and opals.
   (*c*) Wheat, maize, potatoes, tobacco, wine, oranges, fodder grasses.

(2.) Victoria.
   (*a*) Horses, ½ million; cattle, 1½ millions; sheep, 14 millions; butter largely exported.
   (*b*) Gold, £3,000,000 annually; tin, copper, coal.
   (*c*) Wheat and wine.

(3.) South Australia.
   (*a*) Horses, ½ million; cattle, ½ million; sheep, 6 millions.
   (*b*) Copper, gold, silver, lead, etc.
   (*c*) Wheat, oats, barley, potatoes, oranges, lemons, almonds, and olives.

(4.) Queensland.
   (*a*) Horses, ½ million; cattle, 5 millions; sheep, 15 millions; pigs, ½ million.
   (*b*) Gold, copper, tin, lead, quicksilver, antimony.
   (*c*) Wheat, oats, barley, coffee, cotton, oranges, peaches, pine-apples, grapes, bananas, etc.

(For continuation of Notes see page 467.)

CORRESPONDENCE: RULES (as usual).

All replies sent by post this month.

OUR CERTIFICATE COURSE FOR 1901.

BY GEORGE COLLAR, B.A., B.SC.,

Head-Master of the Stockwell Pupil Teachers' School.

TEST QUESTIONS ON LAST MONTH'S WORK.

THEORY OF TEACHING.

SECOND YEAR.—1. In what ways may a "general law" be proved?

2. Explain clearly what is meant by "proceeding from the known to the unknown," and illustrate your answer by references to the teaching of geography.

ARITHMETIC.

BOTH YEARS.—1. By selling 8 tons of tea at 1s. 6½d. per lb. a merchant loses 7½ per cent. At what price should he sell it in order to gain 10 per cent.? (Certificate, 1889.)

2. A retailer marks his goods a per cent. in advance of the wholesale price, but allows a customer b per cent. reduction on his bill. Find his net gain on an article marked for sale at £c.

3. A grocer buys 30 lbs. of tea; he sells 16 lbs. at 2s. 7½d. per lb., and the rest at 2s. 9d. per lb., and thereby makes a profit of 15 per cent. If he had sold all at 2s. 9½d. per lb., what rate per cent. profit would he have made? (Certificate, 1893.)

ENGLISH GRAMMAR AND LITERATURE.

FIRST YEAR.—1. Discuss the changes brought about in the English language by the Norman Conquest.

2. Say what you can of the works of Alfred Austin, and write an account of the poem "Is life worth living?"

SECOND YEAR.—1. What is meant by *pasterns, jades, lig, nook-shotten?*

2. Illustrate from the *Life and Letters* Macaulay's marvellous powers of memory.

GEOGRAPHY.

BOTH YEARS.—1. Give a full account of the commerce of Holland and of Belgium.

2. Write a short account of the minerals and manufactures of Belgium.

HISTORY.

BOTH YEARS.—Write an account of the "glorious first of June."

ALGEBRA.

WOMEN—FIRST YEAR.—A bag contained sovereigns and shillings. If the number of sovereigns is doubled, the contents of the bag will be worth £21; but if the number of shillings is doubled, the contents will be worth only £12. Find how many coins of each kind are in the bag.

MEN—FIRST YEAR.—1. Simplify

$$\frac{4+2\sqrt{3}}{\sqrt{2}+\sqrt{(2+\sqrt{3})}}-\frac{4-2\sqrt{3}}{\sqrt{2}-\sqrt{(2-\sqrt{3})}}.$$

(Certificate, 1893.)

2. Find the square root of $94-42\sqrt{5}$.

MEN—SECOND YEAR.—1. Prove that any positive integer can be expressed in any scale of notation, and transform 1534 from the scale of 6 to the scale of 10.

2. Solve the equations—

(i.) $\dfrac{x+\sqrt{x^2-a^2}}{x-\sqrt{x^2-a^2}}=\dfrac{x}{a}$.

(ii.) $\begin{cases}\sqrt{x}+\sqrt{y}=12.\\ xy=1225.\end{cases}$

FRENCH.

BOTH YEARS.—1. Give a summary of the rules for the position of the personal pronouns, and translate—

(*a*) Send it to us.

(*b*) Do not send it to them.

(*c*) I like him; does he like me?

2. Translate into English:—

Un pauvre solitaire, vivant à la campagne dans le cercle étroit d'une famille calviniste, toujours malade et plusieurs fois insensé, William Cowper, prit la plume à l'âge de cinquante ans, et eut sans le vouloir, sans le savoir l'honneur de servir de guide à la nouvelle école. Cowper fit de la poésie, non plus une broderie brillante destinée à éblouir les yeux et à conquérir les suffrages du grand monde, mais l'expression vraie et naïve de son âme.

3. Translate into French:—

Mr. Vincott mounted the steps of a house, knocked at the door, and was admitted. No sooner had he entered than a man stepped out from the passage. For a while he stood loitering at the entrance to the passage, and then noticing the inn, crossed quickly over and passed through the door beneath my window.

SYLLABUS AND NOTES FOR MARCH.

ENGLISH COMPOSITION.

Write essays on the following:—

1. Man's Place in Nature.
2. Loyalty.
3. Music.
4. The Effect of such Geographical Conditions as Climate on National Character.

THEORY OF TEACHING.

SECOND YEAR.—Study the methods of teaching geography, paying particular attention to the following points:—

1. *Advantages* of a study of geography—
   (*a*) Educational: to develop the imagination, the memory, and the reasoning powers.
   (*b*) Utilitarian: to intending travellers and colonists, and to those engaged in commerce.

2. *Procedure.*—Passing from the features of the neighbourhood to a knowledge of other places; uses of comparisons.

3. *Apparatus*, including maps, models, globes, and articles in the school museum.

Ethics.—The syllabus requires an elementary knowledge of this subject, as far as it is applicable to the teacher's work. We propose, therefore, to give a short sketch of the leading points that the teacher should be familiar with. The subject is sometimes said to be "extremely difficult," and sometimes to be "absurdly easy," but, as a matter of fact, neither description is correct. The first essential in studying it is to make sure that the meaning of each term is thoroughly grasped. Although terms employed in everyday life are used in this as in other sciences, they must not be used loosely or ambiguously. Everybody thinks he knows what is meant by "good conduct," but let the student examine himself thoroughly on the meaning of this term, and he will admit the necessity of our first caution.

The first question in the moral training of children is, "What object should we have in view?" And the best answer is, that we should aim at so training the child that he will pursue a course of right and good conduct under any circumstances in which he may find himself placed. This at first sight is simple enough, but out of it arise two questions—(1) What do we mean by good and right conduct? and (2) How can this object be attained?

In the first place, we must presume that by "conduct" we mean those activities on the moral qualities of which judgments may be passed. This excludes such actions as breathing involuntarily, although the employment of breath to produce sounds, or blowing to produce a desired effect, must be classed as conduct. This consideration at once suggests that voluntary acts are parts of conduct, but does not decide whether acts which *habit* has led us to perform "without thinking" form parts of conduct or not. In other words, is it an excuse, for an act generally condemned as wrong, to say that the doer acted "from force of habit," and "could not help it"?

With respect to habitual acts, it must be noted that each repetition of the act is brought about by a smaller effort of the will than the preceding one; but this is not an excuse, but only a shifting of the responsibility to the time when the habit was acquired. Moreover, the struggle carried on to overcome a bad habit is surely right conduct, even though the effort made may not at first be successful.

We must also distinguish between "good" and "right" conduct. In describing an action as "good," we must consider what end it sought to gain, and the degree of effort made to gain that end. Hence goodness and badness admit of degrees, but "right" and "wrong" are absolute; and perhaps the most important part of the science of ethics is the determination of the ultimate standard of right and wrong. The teacher who reads up the history of ethical theories will find that he is spending his time in an interesting and profitable manner. Let him not be dejected by the seeming greatness of the difference between the views of sages on the question of what is right and what is wrong. He is not called upon to decide between conflicting theories, but, knowing the views held by different

thinkers, he will find ideas in each which will help him in his task of morally training his pupils. Fortunately, also, a knowledge of the fundamental property of moral rectitude is not necessary in order to decide whether an act is right or wrong in ninety-nine cases out of a hundred. Just as the child says at once that a dog is an animal, and a cabbage a vegetable, without knowing those essential characteristics which would enable him to classify diatoms and microbes, so in nearly every case of common occurrence we can at once say that such conduct would be right, and the opposite would be wrong, without having a deep knowledge of ethical theory.

But as the teacher of natural history must know the principles on which plants and animals are classified, so the teacher who is responsible for the moral training of children should try to make himself acquainted with a standard for classifying actions as *right* and *wrong*.

The chief schools of ethical thought are—(1) the **Intuitional**, (2) the **Hedonistic**, and (3) the **Evolutionary**.

(1.) The Intuitionalists hold that there is something in the very nature of an act which enables us to "tell at a glance" whether it is right or wrong (Latin, *intueor* = I look upon). Certainly a judgment can be passed upon most acts without a conscious reference to a standard; hence the teacher can generally act as an intuitionalist, and ask his pupils whether they did not know that a certain act was wrong.

(2.) The word "Hedonistic" is derived from a Greek word meaning pleasure. By this school it was considered that those acts which give pleasure are right, and those that give pain are wrong. But since an act which brings pleasure to the doer may cause pain to others, we must note two divisions of Hedonistic philosophers—(*a*) the *Egoistic*, and (*b*) the *Altruistic*. The former measured the rectitude of actions by the pleasure they brought to the doer. The student no doubt associates Epicurus with this school, and his name has become synonymous with sensualist or glutton; but in reality Epicurus himself taught that the pleasure we should strive after is that peace of mind which results from virtuous conduct. Others of the school, notably Aristippus of Cyrene, taught people to strive for that pleasure which comes from the gratification of an appetite. Hence people called epicures should more correctly be called Cyreniacs. The great majority of Hedonistic philosophers belong to the Altruistic section. According to them, right conduct is that which causes the "greatest happiness of the greatest number." This was the theory adopted by Bentham and John Stuart Mill, and is frequently spoken of as *Utilitarianism*. Moreover, it must be admitted that there are *degrees* in pleasure, and the rectitude of an action depends upon its power to promote the *higher* pleasures rather than the lower or sensual ones. Without giving allegiance to this theory, its teaching may help our readers in dealing with the conduct of their pupils. Care must be taken to associate the pleasure with the act, not with its results. For while it is doubtful whether it is prudent to ask a boy if the act of stealing gave him any real pleasure, it would be altogether wrong to tell him that he had acted wrongly in stealing some sour apples because they had made him ill. Unfortunately this kind of moralising is too common in our reading books and moral teaching. The real inference naturally drawn from such teaching is, that while it is wrong to steal *sour apples*, the theft of a *nice ripe pear* would be a distinctly moral act. A far better plan is to get the children to judge of their acts by the Altruistic standard—by leading them to see the effects on others by supposing themselves in the place of those on whom the consequences of their act would fall.

(3.) The Evolutionists hold that there is continual progress being made in the moral state of man. We are familiar with neither the beginning nor the end, but feel that there is a tendency to move on to something better; and as we approach what were our ideals, so we form new and higher ideals of what we should be. Thus, among savage races cannibalism is regarded as right, while even the patriarchs thought that polygamy and concubinage were morally right. Our ideals have advanced, and, according to the Evolutionary school, we should judge of actions by their tendency towards that perfect state that we long for, but feel is not with us.

Read M'Cunn's *Making of Character*, or Margerison's *Ethics and Education*.

English Grammar and Literature.

First Year.—Prepare the additions to the Saxon stock of the English language other than those already dealt with. This seems very wide, but it must not be made a matter of "cram" or mere mechanical memory work. In most cases it is fairly easy to associate the word with its cause of entry into the language. We shall endeavour to point out a few such associations.

Danish words were introduced by the Danish invasions, and include:—(1.) Geographical names, naturally most common in the parts where the Danes settled. From *-by*, a town, we have Whitby, Appleby. [Note that the local laws or laws of a town are *by-laws*, not bye-laws.] *Beck*, a brook, gives Welbeck. *Fell*, a hill, gives Crossfell, Scawfell. The student should notice that the part of the name which is common to so many hills should not be accented, but the distinctive part—thus, Cròss-fell and Scàw-fell, not Cross-fèll and Scaw-fèll, as these words are so frequently mispronounced. For a similar reason we say, Oxford, Brae-màr, Scàrs-dale. Other words compounded in geographical names are—*force* or *foss*, a waterfall; *-gate*, a road; *-gill*, a narrow valley; *-kirk*, a church; *-thorp*, a village; and *-wick*, a creek. (2.) Many of our common words are of Danish origin, but it is difficult to associate them; the following should be remembered: *are, till, fro, they, them, their, both, call, cast, die, droop, rush, take, thrive, both, ill, same, weak, husband, sister, sky, window.*

Dutch words were introduced (1) through the connection at the time of Edward the Third, together with Flemish words by the weavers—*groat, spool, lash, botch;* (2) through trade and sea-life—for example, *deck, yacht, skipper, dollar;* and (3) through our relations with people of Dutch descent in South Africa—*trek, kopje, lanyer.*

Italian words were introduced owing to the leading part played by Italy in the Revival of Learning; large numbers of them refer to the arts—*sonata, solo, mezzotint, profile, piano.*

The *Spanish words* have mostly come through the Spanish possessions in the New World—*alligator, buffalo, canoe;* but we have also *don, domino, toreador*, names of things met with in Spain.

We have words from about twenty other languages; and as these are, for the most part, names of things of foreign origin, the student should learn the source from which the things were introduced, and then his geography will help his grammar.

Read carefully through Macaulay's *Essay on Milton*.

Second Year.—Study in detail the fourth act of *Henry V.*

Prologue.—9. *Battle* = army in battle array; *umbered* = shaded.

19. Paraphrase—"Do play at dice for the English, whom they expect to take prisoners, and whom they consider of little worth."

Scene i. 23. *Casted slough.* Snakes cast their skin or slough every year, and the casting is preceded by a period of torpor, but followed by a period of great activity.

243. *Flexure*, bowing, bending of the knee.

248. *Balm* here means the oil of consecration; the *sceptre and the ball*, or *orb* and *sceptre*, two emblems of kingly authority held in the hands of monarchs on state occasions, such as their coronation.

251. *Farced*, packed or stuffed. (Lat. *farcire*, to stuff.)

257–8. Shakespeare was probably thinking of the second verse of Psalm cxxvii., which see.

261, 263. *Phœbus, Hyperion*, two names for Apollo the sun-god.

283. Holinshed relates that Henry the Fifth had caused the body of Richard the Second to be removed from Langley and interred at Westminster.

Scene ii. 11. Put them out with courage that flows over them. *Dout* = do out, as *don* (a hat) = do on, *doff* = do off; *superfluous*, from *super*, over, and *fluo*, I flow.

18. *Shales.* Cognate with "shells" and "scales."

29. *Hilding*, contemptible; worthless.

33. *A very little little.* Compare the French phrase, "un tout petit peu."

35. *Tucket-sonance*, a particular bugle-call.

44. *Beaver*, the visor, or part of the helmet that could be let down to protect the face.

60. *Guidon*, banner; ensign.

Scene iii. This scene is particularly fine, and contains the lines best suited for recitation.

26. I am not anxious to have servants wearing my livery.

32. *Share.* The primary meaning of "share" is "cut" or "shear."

40. *Crispian*, the patron saint of shoemakers. St. Crispian's Day is October 25.

50. *With advantages*—that is, he will add a little in telling of them.

65. *Whiles*, the adverb formed from the genitive of the noun.

91. *Achieve* = finish. (Fr. *achever*, to finish.)

96. *Native graves.* Rather, graves in their native land.

130. *Vaward* = vanguard. Teutonic words with *w* often have cognates in *gu* coming through the French. Compare *warrant* and *guarantee, William* and *Guillaume.*

Scene vii. 55. *Skirr*, move swiftly. The word is an imitation of the sound made by a swiftly-moving body.

History.

Both Years.—After the victory of the "first of June" the British fleet remained for the rest of 1794 practically inactive, and the French Government decided to avail themselves of this inactivity to send reinforcements from Brest to Toulon. We have already shown how the allies in the Netherlands were overcome by the vigour of the French attacks, and how the English portions of the force escaped into German territory and returned to England by sea. The occupation of Holland was a great blow to Britain in several ways: (*a*) it marked a military failure; (*b*) it weakened the Channel fleet by giving it a longer coast to watch over; (*c*) it placed the wealthy Dutch merchants at the mercy of the French, so that henceforth Great Britain had to bear nearly the whole pecuniary burden of the campaign. On the other hand, the alliance formed with the French by the new Dutch Government exposed the colonies of the latter to our attacks, so that in 1795 Cape Colony, Malacca, the Dutch possessions on the mainland of India, and parts of Ceylon fell into our hands, and the whole island submitted in 1796, as did also other colonies in the East and West Indies. In 1797 a Dutch fleet set sail to reconquer Cape Colony, but it was captured in Saldanha Bay, near Cape Town.

The difficulty of obtaining supplies for the French naval arsenals to refit the ships, together with the unsuccessful terminations of various small encounters with British ships, made the French Government decide to keep their fleets safe in their harbours, and trust to the work done by swift cruisers against British commerce to weaken their chief opponent.

We have now to deal with the part that Great Britain took in opposing Napoleon's Italian and Egyptian campaigns. After the withdrawal from Toulon, Gibraltar had to serve as the base for the British Mediterranean fleet. This was too far from the scene of actual operations to be of much service; but Corsica seemed much more advantageous, so assistance was given to the Corsicans in driving out the French garrisons, and Corsica was taken under the protection of the British Crown. During these operations Nelson lost his right eye, at the siege of Calvi. In the middle of March 1795 an expedition started from Toulon to recover Corsica, but, after an encounter with the British fleet, was forced to return. The reinforcements which arrived at Toulon shortly after brought the French fleet up to twenty, against the British fleet of thirteen; but disobedience to orders from the Government prevented the French fleet from sailing to attack the British until the latter had been reinforced, first by a convoy of store-ships, and then by nine ships of the line. On November 1, 1795, Admiral Hotham, who had not been very active, was replaced by Hood in the command of the Mediterranean fleet. A section of this, under Nelson, was engaged in cutting off the supplies from the French "army of Italy;" but Devins, the Austrian general, was too timid to take advantage of the assistance afforded by the British ships. Hood was soon succeeded by Admiral Jervis. This great seaman imposed a rigid discipline on the fleet, and brought it up to a splendid state of efficiency. He kept Toulon closely blockaded, and told off Nelson to patrol the Gulf of Genoa, while another subordinate, Admiral Mann, blockaded a French squadron in Cadiz. To provide for the possible loss of Corsica, in which Bonaparte was endeavouring to stir up opposition to the British, Nelson seized Elba, so as to make sure of a naval base in the Mediterranean. In order to concentrate his forces, Jervis called upon Mann to leave Cadiz and join him, after taking in stores at Gibraltar. As Mann came without stores, Jervis sent him back; whereupon, fearing perhaps the Spanish fleet, which had now taken sides with the French, he brought his ships back to England. For this conduct Mann was deprived of his command. While Jervis was employing his fleet, thus diminished by one-third, in the difficult task of arranging the evacuation of Corsica, the Spanish admiral Sangara joined the French in Toulon with his twenty-seven Spanish ships. The evacuation of Corsica was a severe blow to British prestige, and rendered the submission of the Italian states a much easier matter for Bonaparte. On the evacuation of the Mediterranean, Jervis was ordered to take his fleet to Lisbon to protect Portugal, who still remained true to her alliance. So many misfortunes occurred on the stormy journey that he had but ten available ships at Lisbon. On being joined by Nelson, who had brought off the stores from Elba, Jervis, with fifteen ships, took up his station off Cape St. Vincent; and on February 14, 1797, he sighted the Spanish fleet of twenty-seven making for Cadiz. Six of the Spanish ships were right ahead of the others, and Jervis ran his fleet in two columns into the interval. Jervis formed in single line, and effectively cut the six off from the main body, although three from the latter succeeded in joining the smaller body. Jervis then decided to attack the main body first. The Spanish rear-admiral's ship attempted to pass Jervis's flag-ship, the *Victory*, but received such a raking fire that she was driven out of action at once. The British ships were ordered to tack in succession, and the Spaniards tried to profit by this to cross the British line and join their other division. This movement was frustrated by Nelson, who, carrying out the spirit of Jervis's order, though not the letter, brought his own ship across the bows of five large Spanish ships and headed them off. The time thus gained enabled the British ships to come up, and the Spanish fleet bore off in confusion. Nelson's ship, the *Captain*, was much damaged, but he boarded a Spanish vessel, the *San Josef*, and with her captured the *San Nicolas*.. Four of the Spanish ships were captured, and the rest thoroughly demoralised; and Jervis decided to pursue no further, or risk the substantial advantages he had gained.

The effect of this victory was enormous; it showed the rottenness of the Spanish navy, and dispelled the gloomy presentiment of invasion which was to follow the expected junction of the Spanish and French fleets.

Revise Napoleon's campaign in Egypt.

Geography.

Both Years.—Draw a map of the Mediterranean, and study the geography of that sea with special reference to the history course. Notice the positions from which a fleet could check the French fleet assembled in Toulon. See also the narrow strip of land between the Maritime Alps and the Gulf of Genoa, which enabled the fleet to oppose the forces invading Italy, unless they entered the Plain of Lombardy by crossing the Alps (the road along this part, the Riviera, is called the Cornice Road), as it is actually within the range of guns on board ship in many places. Note also the Levant, the north coast of Egypt, and see the peculiar formation of Palestine, which made Acre such an important place from a strategical point of view.

Study in detail the geography of Denmark.

Build.—Jutland is one of the few peninsulas in the world that run north, and, like the others that run north, it is low and level; chief islands—Zealand, Fünen, Falster, Laaland, and Bornholm. Prepare a sketch-map to fix the positions.

Climate.—Colder than parts of Great Britain in corresponding latitudes.

Occupations.—Farming and fishing; the latter principally in the North Sea—cod, herrings, flat-fish, and seals. Farming is very prosperous—corn is grown in large quantities; dairy farming is very largely carried on, its success being largely due to co-operation among the farmers. The collection of eggs and poultry is well organised, and large creameries and butter factories are conveniently placed, to which the farmers send their milk; and thus there is a uniformity about the butter which does not exist in countries in which each small farmer makes his own. This is a great point with the wholesale dealers, and accounts for the popularity of "Danish butter."

The manufactures are not important, the most extensive being woollen goods for home use.

Mark on the map the canals and railways.

Towns.—The chief are on the coast; mark them.

Algebra.

Women—Both Years.—Exercises on factors, and H.C.F. and L.C.M. to be worked by means of factors.

Men—First Year.—Ratio: (1) Operations which may, and which may not, be performed on ratios without altering their value; (2) ratios that may be deduced from other ratios.

Men—Second Year.—Revise permutations and combinations.

Euclid.

Women—First Year.—Revise to end of Prop. 26, and work deductions.

Women—Second Year.—Book II., 1–8, with deductions.

Men—First Year.—Revise Book III., 1–15, with deductions.

Men—Second Year.—Revise Book III., 15 to end, with deductions.

French.

Both Years.—Syntax of the subjunctive mood. Translation and retranslation.

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LONDON MATRICULATION.

JUNE 1901.

BY R. C. B. KERIN, B.A. (LOND.),

First in First-Class Classical Honours at Final; Principal, Carlyon College, 55 Chancery Lane, W.C.,

AND

E. J. SCHWARTZ, M.A., B.SC.

LATIN COURSE FOR MARCH.

1. Sallust, *Catiline*. Revise chaps. 15–45.

2. Grammar.—Learn the verbs of the fourth conjugation that are irregular in the perfect and supine. In the syntax, learn the rules for (*a*) conditional or hypothetical clauses, (*b*) relative clauses, (*c*) causal clauses. Learn the various methods of expressing purpose and result. The construction used after verbs of fearing should be thoroughly known.

3. *Anglicè Reddenda*, 68–78.

4. Sentences from Bradley's *Arnold* or Bayfield's or Allen's *Exercise Book*.

Notes on Grammar.

The normal rules for conditional statements are as follows:—

1. If the indicative, the imperative, or the subjunctive used as an imperative, is found in the apodosis (principal clause), the indicative is used in the protasis ("if" clause).

2. If the subjunctive is used in the apodosis, the subjunctive is also used in the protasis. The subjunctive is used in the apodosis if there is a "would" or "would have" in English, or the equivalent of "would" or "would have"—for example, "could have" is generally = "would have been able." The best practical rule for the student to go by is this: let him look to the apodosis and see whether the subjunctive will be required as above; if not, let him use the indicative in both the protasis and apodosis.

Now, the next question is that of the tense to be used. If the subjunctive is required, use the present subjunctive to denote future time, the imperfect subjunctive to denote present time, and the imperfect or pluperfect subjunctive to denote past time. (The imperfect will denote a continuous action, while the pluperfect will denote a momentary or antecedent action. Occasionally we find the imperfect used for pluperfect—as, *vellem*, "I should have wished.") If the indicative is used, the tenses will be the same as in English, except in regard to future time, where in English, in the protasis, the present is often used to denote future time. In that case, the simple future must be used in Latin in both clauses, if both actions go on together in the future; but if one is over before the other begins, the future perfect and future are to be used—for example, *Cras veniam si potero*, "I shall come to-morrow if I can;" *Quis tibi hoc dicet si abieris?* "Who will tell you this if you go away?" In the first case, the actions denoted by *veniam* and *potero* go on together; in the second case, "going away" is over before the "telling" begins. The literal translations are—"I shall come to-morrow if I shall be able;" "Who will tell you this if you shall have gone away?"

Purpose (or *final*) clauses are expressed in Latin by (*a*) *ut* and subjunctive, (*b*) *qui* and subjunctive, (*c*) *ad* with gerund or gerundive, (*d*) genitive of gerund or gerundive with *causa*, (*e*) supine in *-um* after verbs of motion. *Result* (or *consecutive*) clauses are expressed by *ut* and the subjunctive. The relative with the subjunctive often indicates a result. Avoid using the infinitive to express a purpose. Remember that "that not" is translated by *ut non* in a negative result, by *ne* in a negative purpose. In the same way, *ut nemo* is, "so that no one;" *ne quis*, "in order that no one;" *ut nunquam*, "so that never;" *ne unquam*, "in order that never" or "lest ever;" *ut nusquam*, "so that nowhere;" *ne usquam*, "lest anywhere."

Verbs of fearing are followed by (*a*) *ne* and subjunctive to represent a "that" clause in English; (*b*) *ut*, or *ne non*, to represent a "that not" clause in English; (*c*) infinitive when there is an infinitive in English—for example, *timeo ne hoc dicas; timeo ut (ne non) hoc dicas; timeo hoc dicere.*

The subjunctive is used in relative clauses when the relative denotes (*a*) purpose, (*b*) result, (*c*) concession, (*d*) cause. Under heading (*b*) comes the case when the antecedent of the relative is an indefinite word, when the relative refers to a class and not to definite persons or things. This subjunctive is sometimes known as the descriptive or generic subjunctive. It is very common in Latin. Distinguish *is est qui hoc dicit*, "he is the very man who says this," from *is est qui hoc dicat*, "he is just the man to say this."

Quod, meaning "because," takes the subjunctive when the reason alleged is not the reason of the speaker or writer, but that of some one else—for example, *Ignoscit ei quod huic pepercerit*, "He pardons him for having spared this man" (as he says); *Eum quod patrem interfecisset accusavit*, "He accused him of killing his father" (because, as he said, he killed his father). *Non quo*, "not because," nearly always requires the subjunctive; since, if you deny a reason, you deny it because some one has brought, or is likely to bring, it forward. These subjunctives are due really to oratio obliqua, and are called subjunctives of sub-oblique oration.

The following summary, taken from Postgate, will be useful:—

Translation of "that." The English "that" must be differently translated into Latin according to its sense:—1. After words of saying and thinking, by infinitive and accusative. 2. If it means "the fact that," by *quod*. 3. If it denotes "consequence," by *ut*, etc. 4. If it denotes "purpose," by *ut*. 5. If it denotes "the object of fear," by *ne*. 6. After negatives, often by *quin*. 7. "Oh that" is expressed by *utinam*.

Translation of "to." The English "to" with verbs is translated:—1. By the simple infinitive. 2. After verbs of hoping, threatening, and promising, by the future infinitive and accusative. 3. "To" of purpose is variously expressed in Latin. For "He sent soldiers to burn the town" we may have:—

Misit milites
(1) *ut urbem cremarent.*
(2) *qui urbem cremarent.*
(3) *ad urbem cremandam.*
(4) *urbis cremandae causa.*
(5) *urbem crematum.*

Typical Sentences.

27. "Most people thought that if news of Pompey's defeat had not come then, Domitius would have taken the city by storm."

Nisi tum nuntii de Pompeii clade essent allati, plerique Domitium urbem expugnaturum fuisse existimabant.

Notes.—(*a*) The apodosis in this sentence is not "Most people thought," but "would have taken." We have seen before that "would have" in a principal clause is expressed by the pluperfect subjunctive. It is not permissible here, however, to use the pluperfect subjunctive, as the "would have" sentence is introduced by "that," and depends on a verb of thinking, which requires the infinitive. Now, "would have," when the infinitive is required, is expressed in two ways—(1) if the verb is active, and has a supine, by the future participle with *fuisse*; (2) by *futurum fuisse ut* and the imperfect subjunctive if the verb (*a*) has no supine or (*b*) is passive. Hence above we have *expugnaturum* (agreeing with *Domitium*) *fuisse*. (*b*) *Essent allati* is in subjunctive, because the apodosis to the "if" clause in oratio recta would have been in subjunctive. (*c*) "Of," when equivalent to "concerning," is often translated by *de*. With verbs it is generally translated in this way—for example, "I speak of you," *De te loquor*. (*d*) Disinguish *plerique*, "most people," from *plurimi*, "very many."

28. "No one can tell me what his father would have done if he had known that the citizens had been within an ace of destruction."

Nemo quid pater eius facturus fuerit mihi dicere potest si haud multum abfuisse quin cives perirent scivisset.

Notes.—(*a*) The apodosis to the "if" clause is again in a dependent clause—namely, in an indirect question clause depending on *dixit*. The apodosis containing "would have" would in oratio recta be pluperfect subjunctive; therefore, according to the rule, the verb in the "if" clause is in the subjunctive; hence we write *scivisset*. (*b*) In dependent questions and in consecutive clauses (that is, in clauses expressing result, introduced in English by "so that"), "would have," if the verb is active, is expressed by the so-called periphrastic subjunctive (that is, by the future participle and the perfect subjunctive of *sum*). Hence above we write, *facturus fuerit*. (*c*) Note how to express "within an ace of"—literally, "it was not much absent but that."

29. "We said that if we had ordered you to go to Rome the town would not have been lost."

Si tibi ut Romam ires imperavissemus futurum fuisse ut oppidum amitteretur negavimus.

Notes.—(*a*) The subjunctive, *imperavissemus*, is used as before, because the apodosis is "would have been lost." (*b*) "Would have been lost" has to be translated by the infinitive, because verbs of saying require the infinitive when in English there is a "that" clause or its equivalent. Now, "would have been," when the infinitive is required, is translated by *futurum fuisse ut* and the imperfect subjunctive passive, in accordance with the rules given above. (*c*) Note that in English, where we say "say.....that not," the Latins place the negative with the verb of saying, and use *nego*—literally, "deny that." (*d*) Be careful not to use the infinitive after *impero*, "order." The only verb of ordering that normally requires the infinitive is *iubeo*. Be careful, too, not to use the accusative with *impero*. The person

to whom an order is given is put in the dative; the thing that is ordered is put in the accusative.

30. "It is of paramount importance to you and your uncle whether he stops at his house in the country or goes to the beautiful city of Capua."

Utrum domi suae ruri maneat an Capuam in illam pulcherrimam urbem eat tua et avunculi tui maxime interest.

Notes.—(*a*) "It is of importance to" is expressed by *interest*. Now the dative must not be used after *interest*. The person to whom a thing is of interest is expressed by the genitive, except when the person is represented by a personal pronoun of the first or second person, or by the third reflexive. In this case the ablative feminine singular of the corresponding possessive adjective is used. Hence above we write *tua* and *avunculi*. (*b*) The subjunctives *maneat* and *eat* are due to the fact that they are the verbs in a dependent interrogative sentence. Note the tenses of the subjunctive, and see the rules for the sequence of tenses. (*c*) *Utrum.....an*, "whether.....or," in interrogative sentences. Be careful not to use *sive.....sive* (found in adverbial sentences), or *aut.....aut*, "either.....or." (*d*) "At his house," "at my house," *domi suae*, *domi meae*; but if you want to say "at my father's," write *apud patrem*, not *domi patris*. *In domo patris* = "in the house of my father;" *in domo mea* means, "in my house."

Sentences for Practice.

(Readers can have their solutions corrected by sending them to Editor Matriculation Course, *P.T.*, and enclosing 7 stamps.)

1. If you had told my brother what would have happened (*evenire*) he would have refused to tell you.

2. I should not have praised you if you had been persuaded to go to the beautiful city of Syracuse.

3. On learning that the city had been plundered by the Gauls, he made up his mind to abandon his allies and join the enemy.

4. It is certain that your son is not in Delos. It is uncertain, however, whether he is in Syracuse or Corinth.

5. It is of the greatest importance to me whether you stop at Rome or remain a week in the charming city of Naples.

6. They could have caught the fox if they had tried to run after it at full speed.

7. O happy citizen, to have won the crown without being injured by this weapon!

8. He knows that it would not have mattered if he had been prevented from injuring such men as these.

9. He was so angry with the soldier that he at once marched to the winter camp at Paris without saying whether he would give him the reward or not.

10. It is well known (*constat*) that it is not every one who prefers to meet death a hundred times rather than live in dishonour.

Test Paper.

(Readers can have their solutions corrected by sending them to Editor Matriculation Course, *P.T.*, and enclosing 7 stamps.)

1. Decline in the singular, *lacus*, *merces*, *ebur*; in the plural, *vir*, *salus*, *volnus*. Give the ablative plural of *filia* and *coniux*, and the gender of *nemus*, *humus*, *piscis*, *seges*, *crinis*.

2. Write down the other degrees of comparison of *acer*, *iuvenis*, *plurimum*, *nequam*, *humiliter*, *proxime*.

3. Decline throughout all genders—*iste*, *celer*, in the singular; *par*, *quidam*, in the plural.

4. Write out the imperative of *sum*, the present indicative passive of *fero*; and give the first person singular of the perfect indicative active and the supine of *lavo*, *quaero*, *reperio*, *cognosco*.

5. Parse the following words, giving the principal parts of each verb, the gender and genitive singular of each noun:—*ablatum*, *trivere*, *foedere*, *inquitis*, *ălas*, *ālas*, *feris* (2).

6. What cases are found with *misereor*, *rogo*, *accuso*, *indulgeo*, *potior*, *indignus?* Illustrate.

7. Translate, explaining the syntax of italicised words:—(1) Quot *annos Athenis* habitavit? (2) Haec *sibi curae* esse respondit. (3) Scisne *quanti* hortos *emerit?* (4) *Auxilii ferendi* causa proficisitur.

8. Put into Latin:—(1) To be happy we have need of virtue. (2) The next day he repented his crime. (3) Tell me whom you saw at Comum. (4) Cæsar is too strong to be conquered.

ENGLISH COURSE FOR MARCH.

1. Grammar.—Compound words, prefixes and suffixes (Nesfield, pp. 369–417). Miscellaneous words, phrases, and constructions (Nesfield, pp. 193–213). Definitions of grammatical terms (Nesfield, pp. 213–217).

2. History.—From the death of Henry the Eighth to the death of James the First.

3. Literature.—Stopford Brooke's *Primer of English Literature*, chap. vi. In conjunction with this read in Professor Hale's *Longer English Poems* the selections from Dryden and Pope. Note the critical appreciation of these two poets in the notes at the end of the selections. *Hudibras* is an important work in this period. Candidates are often required to give an account of some well-known literary work. In this period I should advise our readers to know the substance of *Hudibras*, *The Dunciad*, *Absalom and Achitophel*, *Gulliver's Travels*, and *The Battle of the Books*.

Grammar Notes.

Note in Nesfield, p. 369, how compound nouns and adjectives and verbs can be formed in English. Note that compound words can be classified under two heads—(1) unrelated; (2) related. In the first case the words forming the compound have no grammatical relation to one another—as, oil-lamp, etc. In the second case the component words are connected by a grammatical relationship—for example, cast-away, etc. Among the disguised compounds found on pp. 372–375, you should note especially daisy, Friday, gauntlet, gossamer, gossip, handiwork, hansel, heyday, husband, hussy, hustings, lady, livelihood (false analogy with likelihood), mulled-ale, nickname, nightingale, nostril, prose, quagmire, Saturday, sheriff, sirloin (the old derivation from "*sir*," and the idea that it was so called because Charles the Second (?) knighted a loin and called it *sirloin*, is disproved by the fact that the word is found in account books of the reign of Henry the Sixth: so do chronology and the stern facts of history treat our once most cherished derivations!), squirrel, stirrup, tadpole, tantamount, topsy-turvy, trade-wind, tramway, well-away, window, wassail, twilight, bridegroom (note the intrusive *r*), auger, cobweb, atone, filibuster, furlong. Among the mistaken compounds, and words which were wrongly spelt owing to a mistaken etymology, are belfry, caterpillar, counterpane, country-dance, crayfish, frontispiece, gridiron, humble-pie, lanthorn, nightmare, pick-axe, policies, posthumous, sovereign (false analogy with reign), titmouse, uproar, wall-eyed. Note that a *hybrid* is a word the component parts of which are taken from different languages—for example, bicycle. Of the hybrids given on p. 377, note especially hautboy, beefeater, orchard.

Note the definition of root, derivative, primary, secondary, etc. A root is the significant element of a word, and is generally not a word, though in some English grammars a root is defined as a word in its simplest form. Note what is meant by prefixes, suffixes, and affixes. You should be able to write down a certain number of noun, adjective, and verb suffixes, either Teutonic or Romance, and at the same time give examples of each. Among the suffixes to which special attention should be paid is—*en* (*a*) as a noun suffix; (*b*) as a verb suffix; (*c*) as an adjectival suffix. As a noun suffix, it (*a*) indicates feminine gender; (*b*) is a sign of the plural; (*c*) has a passive signification; (*d*) has a diminutive force. As an adjectival suffix, it is used to form the past participle of certain verbs, and also indicates "made of" or "pertaining to." As a verbal suffix *en* has a causal force. *Er* is another important suffix, the force of which you should know. You should also make a list of diminutive and augmentative suffixes.

With regard to adjectives in *ed*, strictly speaking, they should be formed from verbs; hence, when the word *talented* was first introduced into the language, there was a loud outcry against this *neologism*, as it was formed from a noun and not from a verb. However, in support of this unusual formation may be quoted the example of words like "spurred" and "booted," which are also formed from nouns.

You might also note that objection has been raised to the adjective *reliable*, on the ground that it was not formed from a transitive verb, but from an intransitive verb. Adjectives in *able* are passive in signification—for example, *eatable*, "that which can be eaten." Now *reliable* does not mean "that which can be relied," but "that which can be relied upon."

The suffix *ous* denotes "full of"—for example, beauteous; and, through false analogy, the endings of certain words have adopted this form—for example, *righteous*, which comes from Middle English *rightwis*, etc.

Chapter xx. in Nesfield, dealing with miscellaneous words, phrases, and constructions, is a very important and interesting chapter. A question dealing with this is often set in the Matriculation. Note, p. 195, the discussion over the phrase "as thee." Note, p. 196, the discussion on *but* followed by a nominative. Note, pp. 198, 199, the difference between "he dare" and "he dares." Note, on p. 201, the origin of the phrases "I had rather," etc. Some grammarians consider that "I had rather" developed by mistake out of "I'd rather," which was used as a contraction for "I would rather." The objection to Nesfield's explanation is that you would also expect "I have rather" to be used as well as "I had rather." The origin of "if you like," on p. 203, is very important (comp. French, *s'il vous plaît*). Note, p. 204, "it is me" and "methinks." On p. 205, "our

mutual friend" is another examination question. Some defenders of Dickens's grammar hold that he was quite aware it was bad grammar when he used it, but that is doubtful. Even such a well-known purist as Mr. Labouchere used it in *Truth* at the time of the controversy between himself and Mr. Gladstone concerning his non-admission to the Cabinet. Note, on p. 213, some English phrases of French origin. The definitions of grammatical terms, pp. 213, etc., are extremely important.

ARITHMETIC COURSE.

Read chapter xxxii. of Pendlebury.

Solution to example :—

1. What he sells for £120 he bought for £100.

$\therefore$ what he sells for £112½ he bought for £$\frac{100 \times 112\frac{1}{2}}{120}$, or £$\frac{375}{4}$.

So that what he bought for £$\frac{375}{4}$ he sells for £130.

$\therefore$ what he bought for £100 he sells for £$\frac{130 \times 100 \times 4}{375}$

$= £138\frac{2}{3}$.

So that gain per cent. is £$38\frac{2}{3}$.

2. Here the interest on £1303, 6s. 8d. for seven years is the excess of £1884, 18s. 11d. over £1303, 6s. 8d., or £581, 12s. 3d.

$\therefore$ interest on £$1303\frac{1}{3}$ for one year is $\frac{1}{7}$ of £581, 12s. 3d., or £83, 1s. 9d.

$\therefore$ interest on £100 for one year is £$\frac{100 \times 83,\ 1s.\ 9d}{1303\frac{1}{3}}$.

$= £\frac{30}{391}$ of £83, 1s. 9d.

$= £6,\ 7s.$ approx.

So that the per cent. is roughly $6\frac{1}{4}$.

Examples :—

1. The real cost of an article is 56 per cent. of the price at which it is marked for sale; it is sold at a trade discount of $12\frac{1}{2}$ per cent. How much does the seller gain per cent.?

2. A person has a certain amount of 4 per cent. stock, which he sells at £$117\frac{1}{2}$, and invests half the proceeds in 2 per cent. stock at 96, and the rest in 3 per cents. at 99. He thus reduces his income by £20. What amount of original stock had he?

GEOMETRY COURSE.

Read and revise the whole of Book III.

Solutions to riders :—

1. Using the method of IV. 1, let AB be any chord of the required length in the circle whose centre is C. Draw CD perpendicular to AB; with centre C and radius CD describe a circle. If now through the given point a tangent be drawn to this latter circle, it will, by III. 14, be the required chord.

2. Let ABCD be a quadrilateral circumscribing the circle PQRS, where AB, BC, CD, DA touch the circle at the points P, Q, R, and S respectively.

Then by III. 17 corollary

AP = AS,
PB = BQ,
DR = DS,
CR = CQ.

Adding these equals AB and DC = AD and BC.

Riders:—

1. Given base, vertical angle, and point where the bisector of the vertical angle cuts the base, construct the triangle.

2. Prove that a triangle with given base and given vertical angle is of greatest area when isosceles.

ALGEBRA COURSE.

Read chapters xxvii. and xxviii. of Hall and Knight.

Solutions :—

1.
$$\begin{aligned} & x^5 - x^4 - 2x^3 + 2x^2 - 3x + 3 \\ &= x^4(x-1) - 2x^2(x-1) - 3(x-1) \\ &= (x-1)(x^4 - 2x^2 - 3) \\ &= (x-1)(x^2-3)(x^2+1). \\ & x^3 + x^2 - 3x - 3 \\ &= x^2(x+1) - 3(x+1) = (x+1)(x^2-3). \end{aligned}$$

$\therefore x^2 - 3$ is their H.C.F. So that both expressions will be zero when $x^2 - 3 = 0$; that is, when $x = \pm\sqrt{3}$.

2.
$$8x - \frac{12}{x} = 5.$$

$$\therefore 8x^2 - 5x - 12 = 0.$$

$$\therefore x^2 - \frac{5}{8}x = \frac{3}{2}.$$

$$\therefore x^2 - \frac{5}{8}x + \left(\frac{5}{16}\right)^2 = \frac{3}{2} + \frac{25}{256} = \frac{409}{256}.$$

$$\therefore x - \frac{5}{16} = \frac{\pm\sqrt{409}}{16}, \text{ or } x = \frac{5 \pm \sqrt{409}}{16} = \frac{5 \pm 20{\cdot}22}{16} = 1{\cdot}57 \text{ or } {\cdot}95.$$

Examples :—

1. Solve $x^3 + 1 = 0$.

2. Factorise $x^2 + 4xy + 3y^2 + 2x + 4y + 1 = 0$.

SCIENCE COURSE.

In Science, chapter xiii. of the Mechanics portion, and chapters vii. and viii. of the Chemical portion, of Briggs' *Elementary Science*.

In Loney's *Mechanics*, chapters vii. and viii., and chapter xx. of the Hydrostatics.

1. A rectangular area, the length being five times the breadth, contains 70,000 acres. How many miles of fencing would be necessary to enclose it?

Here the area is equal to five times of the square of the breadth; hence $5(\text{breadth})^2 = 70000$.

$$\therefore (\text{breadth})^2 = 14000 \text{ acres}$$
$$= \frac{14000}{640} \text{ square miles}$$
$$= \frac{1400}{64} \text{ square miles.}$$

$\therefore$ the breadth is $\frac{10\sqrt{14}}{8}$ miles.

$\therefore$ the length $= \frac{50\sqrt{14}}{8}$ miles.

$$\therefore \text{length of fencing required} = 2\left[\frac{10\sqrt{14} + 50\sqrt{14}}{8}\right]$$
$$= 15\sqrt{14} \text{ miles}$$
$$= 15(3{\cdot}742) = 56{\cdot}13 \text{ miles approx.}$$

2. Find the remainder which results from the division of $x^4 + 2x^3 + 3x^2 + 4x + 5$ by $x - e$.

Let R be the required remainder, which is therefore independent of x. Let Q be the quotient.

$$\therefore x^4 + 2x^3 + 3x^2 + 4x + 5 = Q(x - e) + R.$$

This being an identity, is true for all values of x; and therefore when $x = e$, in this equation then put $x = e$.

$\therefore e^4 + 2e^3 + 3e^2 + 4e + 5 = R$. So that the remainder is $e^4 + 2e^3 + 3e^2 + 4e + 5$. This, of course, could also have been found by ordinary division.

3. If x, y, z, u be positive integers, show that $\frac{x}{y}$, $\frac{x+z}{y+u}$, $\frac{z}{u}$ are either in ascending or descending order of magnitude.

$$\frac{x}{y} = \frac{xu(y+u)}{yu(y+u)} = \frac{xyu + xu^2}{yu(y+u)} \quad \ldots \quad (1)$$

$$\frac{x+z}{y+u} = \frac{yu(x+z)}{yu(y+u)} = \frac{xyu + yzu}{yu(y+u)} \quad \ldots \quad (2)$$

$$\frac{z}{u} = \frac{zy(y+u)}{yu(y+u)} = \frac{zyu + zy^2}{yu(y+u)} \quad \ldots \quad (3)$$

Now, if (1) be greater than (2),

$xyu + xu^2$ is greater than $xyu + yzu$.
$\therefore xu^2$,, ,, yzu.
$\therefore xu$,, ,, yz.
$\therefore xyu$,, ,, zy^2.
$\therefore xyu + yzu$,, ,, $zy^2 + zyu$.
$\therefore$ (2) is greater than (3).

Similarly, had (1) been less than (2), we could have proved (2) less than (3); so that in either case (1), (2), and (3) are in order of magnitude.

4. Find a geometric series whose second term is 6, and sum to infinity 49.

Let a be first term, and r the common ratio.

$$\therefore ar = 6 \quad \ldots \quad (1)$$

$$\text{and } \frac{a}{1-r} = 49 \quad \ldots \quad (2)$$

Dividing (1) by (2),

$$r(1-r) = \frac{6}{49}.$$

$$\therefore 49r^2 - 49r + 6 = 0.$$

$$\therefore (7r-1)(7r-6) = 0.$$

$$\therefore r = \frac{1}{7} \text{ or } \frac{6}{7}.$$

$$\therefore \text{1st term} = \frac{\text{2nd term}}{r} = 6 \div \frac{1}{7} \text{ or } 6 \div \frac{6}{7} = 42 \text{ or } 7.$$

$\therefore$ series is 42, 6, $\frac{6}{7}$, etc., or 7, 6, $\frac{36}{7}$, etc.

OUR QUERY COLUMN.

RULES.

1. Each correspondent is restricted to *one* question.
2. Each query must be accompanied by the name and address of the correspondent, and the *coupon* which appears on the back wrapper of the current number of the Journal.
3. CORRESPONDENTS MUST IN ALL CASES STATE THE SOURCE FROM WHICH THEIR QUERY HAS BEEN OBTAINED.

The Editor reserves to himself the right to decline to answer any question which is, in his judgment, unsuited to the Magazine.

C. Nicholson.—Without multiplying out the expressions, show (*a*) that

$(a + b + c)^3 - (b + c - a)^3 - (c + a - b)^3 - (a + b - c)^3$

is some multiple (M) of abc;

(*b*) that M = 24.

(Second Stage Math., Science Exam., 1900.)

(*a*) We cannot state with certainty how you are expected to work this. You are probably expected to observe that *if* you were to cube the four expressions, you would get the same terms in each, though a certain term may in one case be positive, and in the other negative. In fact, you are expected to show that the signs are such that all terms cancel except the term containing abc.

It is useful to realise that in raising a given expression, say $a + b + c$, to any power, say the third, every term in the answer is the result of taking *one* letter, and *one* only, from *each* of the *three* rows

$$a + b + c,$$
$$a + b + c,$$
$$a + b + c.$$

Thus, by taking the a in the top row, the b in the middle row, and the c in the bottom row, we get the term abc; and it is positive. But there are other ways of selecting an a, b, and c; there are 6 in all.

You may then, in this way, easily observe (1) that all possible terms cancel except those containing abc; (2) that you get 6 abc from each of the *four* given terms, and by carefully observing the final signs you will get 24 abc.

Or, by using your knowledge of the factors of the sum or difference of two cubes, and the difference of two squares, you may, *without actual multiplication*, obtain 24 abc as the result.

Thus—

$$\begin{aligned}
&[(a + b + c)^3 - (b + c - a)^3] - [(c + a - b)^3 + (a + b - c)^3] \\
&= \{(a + b + c) - (b + c - a)\}\{(a + b + c)^2 + (a + b + c)(b + c - a) \\
&\quad + (b + c - a)^2\} - \{(c + a - b) + (a + b - c)\}\{(c + a - b)^2 \\
&\quad - (c + a - b)(a + b - c) + (a + b - c)^2\} \\
&= 2a\{(a + b + c)^2 + (b + c + a)(b + c - a) + (b + c - a)^2\} \\
&\quad - 2a\{(c + a - b)^2 - (a + c - b)(a - c - b) + (a + b - c)^2\} \\
&= 2a\{(a + b + c)^2 - (c + a - b)^2 + (b + c + a)(b + c - a) \\
&\quad + (a + c - b)(a - c - b) + (b + c - a)^2 - (a + b - c)^2\} \\
&= 2a\{(2a + 2c)2b + (b + c)^2 - a^2 + a^2 - (c - b)^2 + 2b(-2a + 2c)\} \\
&= 2a\{8bc + (b + c)^2 - (c - b)^2\} \\
&= 2a\{8bc + 2c(2b)\} = 2a(12bc) = 24\,abc.
\end{aligned}$$

No, we cannot.

J. H. Boardman.—A is a smooth fixed point above a rough horizontal plane, BC, of indefinite length; M is a particle placed on the plane; to M a thread is fastened which passes over the smooth point and carries a weight P at the other end. Find the largest value of P for which M would stay at rest in any position. (Adv. Mech., 1897.)

Forces acting on M are (1) the tension P poundals from M to A; (2) the force of gravity Mg poundals; (3) the reaction of the plane BC, which is made up of two parts—namely, the perpendicular reaction R from plane BC, and the friction F in the direction B to C (A is to left of M).

Take the position in which AM is inclined θ to BC.

For no vertical motion,

$$Mg = R + P \sin \theta.$$

For no horizontal motion,

P cos θ must be not greater than F,

or P cos θ ,, ,, ,, μR;

that is, P cos θ ,, ,, ,, $\mu(Mg - P \sin \theta)$;

that is, P cos $\theta + \mu P \sin \theta$ must be not greater than $Mg\mu$;

that is, P must be not greater than $Mg\mu \div (\cos \theta + \mu \sin \theta)$.

Since the tension in the string is the same throughout, the mass P must not be greater than $M\mu \div (\cos \theta + \mu \sin \theta)$ pounds.

Royal Irish.—A tradesman professes to retail his tea at 10 per cent. profit, but in reality he mixes with it some inferior tea amounting to one-quarter of the weight of the whole. The inferior tea is four-fifths of the price of the original tea. Find his true percentage of profit. (R.U.I., First Arts.)

Suppose the tradesman *buys* 1 lb. at a price x. He gets $\frac{11}{10}x$ for the pound which he *sells*. But this tea, we are told, really costs $\frac{3}{4}x + \frac{1}{4}$ of $\frac{4}{5}x$.

Hence he gains $\frac{11}{10}x - \left\{\frac{3}{4}x + \frac{1}{4} \text{ of } \frac{4}{5}x\right\}$,

or $\frac{11}{10}x - \frac{3}{4}x - \frac{1}{5}x$;

that is, $\frac{3x}{20}$, or $\frac{15}{100}x$, or 15 per cent.

Bene.—If the expressions $ax^3 + bx + c$ and $a + bx^2 + cx^3$ have a common quadratic factor, prove that $a^2 - ab - c^2 = 0$.

When the condition is satisfied, find the factors of the expression. (Cambridge Senior Paper, 1890.)

Let $px^2 + qx + r$ be the common quadratic factor. Divide it into $ax^3 + bx + c$, thus—

$$\begin{array}{l|l}
px^2 + qx + r & ax^3 + bx + c \\
 & ax^3 + \frac{aq}{p}x^2 + \frac{ar}{p}x \qquad \left(\frac{a}{p}x - \frac{aq}{p^2}\right. \\
\hline
 & -\frac{aq}{p}x^2 - \left(\frac{ar}{p} - b\right)x + c \\
 & -\frac{aq}{p}x^2 - \frac{aq^2}{p^2}x - \frac{aqr}{p^2}.
\end{array}$$

Since the remainder must be zero, we have

$$\frac{ar}{p} - b = \frac{aq^2}{p^2}; \text{ that is, } apr - bp^2 = aq^2 \quad . \quad . \quad (1),$$

and $-\frac{aqr}{p^2} = c$; that is, $aqr = -cp^2$ . . . . . (2).

By dividing $cx^3 + bx^2 + a$ in the same manner, we obtain

$$cq^2 = cpr + bpq \quad . \quad . \quad . \quad . \quad . \quad . \quad (3).$$
$$ap^2 = bpr - cqr \quad . \quad . \quad . \quad . \quad . \quad . \quad (4).$$

(1) − (2) gives

$$(a - c)q^2 = pr(a - c) - bp(p + q),$$
$$\text{or, } (a - c)(q^2 - pr) = -bp(p + q) \quad . \quad . \quad (5).$$

Similarly, (3) − (4) gives

$$(a - c)(p^2 - qr) = bpr \quad . \quad . \quad . \quad . \quad (6).$$

(5) ÷ (6) gives

$$\frac{q^2 - pr}{p^2 - qr} = -\frac{p+q}{r},$$

which, when simplified, gives

$$p^2 - r^2 = -q(p - r),$$
$$\text{or, } (p + r)(p - r) + q(p - r) = 0,$$
$$\text{or, } (p - r)(p + q + r) = 0.$$

∴ either $p - r = 0$, or $p + q + r = 0$; that is, either $p = r$, or $p + q + r = 0$.

Try $p = r$. In (1) put r for p, then

$$aq^2 = ar^2 - br^2, \text{ or } \frac{q^2}{r^2} = \frac{a-b}{a}. \quad . \quad . \quad . \quad (7)$$

In (2) put r for p, then

$$cr^2 = -aqr, \text{ or } \frac{q}{r} = -\frac{c}{a}. \quad . \quad . \quad . \quad . \quad . \quad (8)$$

From (7) and (8) it follows that

$$\frac{c^2}{a^2} = \frac{a-b}{a};$$

that is, $c^2 = a^2 - ab$, or $a^2 - ab - c^2 = 0$. *Q.E.D.*

Now $ax^3 + bx + c$ is the product of $px^2 + qx + r$ and $\frac{a}{p}x - \frac{aq}{p^2}$; and using the relations $p = r$ and $\frac{q}{r} = -\frac{c}{a}$, the product of these factors becomes

$$\left(rx^2 - \frac{cr}{a}x + r\right)\left(\frac{a}{r}x + \frac{ac}{ar}\right);$$

that is, $\left(x^2 - \frac{c}{a}x + 1\right)(ax + c)$, which gives the required factors of $ax^3 + bx + c$.

The factors of $cx^3 + bx^2 + a$, in like manner, are found to be $x^2 - \frac{c}{a}x + 1$ and $cx + b + \frac{c^2}{a}$.

By working with the condition $p + q + r = 0$, we should obtain the condition $a + b + c = 0$. By using this, other factors of the given expressions are very readily obtained.

Redder.—A wire of resistance r connects A and B, two points in a circuit, the resistance of the remainder of which is R. If, without any other change being made, A and B are also connected by $(n - 1)$ other wires, the resistance of each of which is r, show that the heat produced in the n wires together will be greater or less than that produced in the first wire according as r is greater or less than $R\sqrt{n}$.

(Board of Education, Evening Exam. in Elect. and Mag., May 1900.)

The heat produced between two points in a circuit is equivalent to the work performed between those points, providing no chemical work is done in that part of the circuit. Now, neglecting thermo-electric effects, which will generally be small, work performed in these circumstances = (current)^2 × resistance × time.

I. In the first case, total resistance of circuit = R + r.

Let E = E.M.F. in circuit. Then current produced

$$= \frac{E}{R + r}.$$

Let W_1 = work done, in time t, by this current in traversing the wire of resistance r. Then

$$W_1 = \left(\frac{E}{R + r}\right)^2 \times r \times t. \quad . \quad . \quad . \quad (1)$$

II. The points A and B are now supposed to be connected by n wires, each of resistance r, arranged in parallel. Hence resistance between points A and B of circuit = $\frac{r}{n}$.

Total resistance of circuit = $R + \frac{r}{n}$.

With the same E.M.F. as before, the current produced will be equal to $\frac{E}{R + \frac{r}{n}}$.

Let W_2 = work done between points A and B in time t.

Then $W_2 = \left(\frac{E}{R + \frac{r}{n}}\right)^2 \times \frac{r}{n} \times t. \quad . \quad . \quad . \quad . \quad . \quad (2)$

Dividing (2) by (1), we get

$$\frac{W_2}{W_1} = \left(\frac{R + r}{R + \frac{r}{n}}\right)^2 \times \frac{1}{n} = a^2 \text{ (say)}.$$

Now, when the heat produced in the n wires connected in parallel is greater than that produced in the single wire in Case I., a^2 will be greater than 1, and therefore a will be greater than 1. When the same amount of work is done in the two cases, $a^2 = 1$, and therefore $a = 1$. When $a < 1$, the work done in the n wires connected in parallel will be less than that done in the single wire in Case I.

$$\left(\frac{R + r}{R + \frac{r}{n}}\right)^2 \times \frac{1}{n} = \frac{n(R + r)^2}{(nR + r)^2} = a^2.$$

$$\therefore \frac{(R + r)\sqrt{n}}{nR + r} = a.$$

Strictly speaking, we ought to equate the fraction on the left of this expression to $\pm a$. The negative value of a leads, however, to a negative value of r, which is impossible.

$$\therefore r(\sqrt{n} - a) = nRa - R\sqrt{n} = R\sqrt{n}(a\sqrt{n} - 1).$$

$$\therefore r = R\sqrt{n}\left(\frac{a\sqrt{n} - 1}{\sqrt{n} - a}\right).$$

Hence r will be less than, equal to, or greater than $R\sqrt{n}$ according as the fraction within the brackets is less than, equal to, or greater than 1.

A. When $a = 1$,

$$\frac{a\sqrt{n} - 1}{\sqrt{n} - a} = \frac{\sqrt{n} - 1}{\sqrt{n} - 1} = 1.$$

Hence, in this case, where equal amounts of work are done in Cases I. and II., $r = \sqrt{n}R$.

B. Let $a > 1$. Then, since n may have any of the positive integral values 2, 3, 4, 5, 6 . . . ,

$\sqrt{n}$ must be greater than 1.

$\therefore a\sqrt{n} - 1$ must be positive.

It is obvious that a cannot be greater than $\sqrt{n}$, since, if this were so, the denominator of the fraction would become negative, and this would make r negative, which would be an impossible condition.

$$\text{Also, } \frac{a\sqrt{n} - 1}{\sqrt{n} - a} = \frac{a(a\sqrt{n} - 1)}{a\sqrt{n} - a^2}.$$

Since a is greater than 1, we have

$$(a\sqrt{n} - a^2) < (a\sqrt{n} - 1).$$

$$\text{Also, } a(a\sqrt{n} - 1) > (a\sqrt{n} - 1).$$

Hence the value of the fraction will be necessarily greater than 1, and $r > R\sqrt{n}$.

C. Let $a < 1$.

Then, since $a^2 < 1$, we have

$$(a\sqrt{n} - a^2) > a\sqrt{n} - 1. \quad \therefore \frac{a\sqrt{n} - 1}{a\sqrt{n} - a^2} < 1.$$

$$\text{Hence } \frac{a\sqrt{n} - 1}{a\sqrt{n} - a} = \frac{a(a\sqrt{n} - 1)}{a\sqrt{n} - a^2} = \text{a value less than 1.}$$

Hence, in this case, $r < R\sqrt{n}$.

Wm. Cranston.—It has been stated more than once that the solutions of geometrical "riders" in the Scotch Tutorial Section do not pretend to be the shortest and best. A short solution does not always appeal to weak candidates—the longer solution, every step of which is quite plain, may encourage such candidates to think for themselves; the short solution is found by experience to often defeat its purpose. In regard to Query II., it is quite evident that figures (1) and (2) are given to *suggest* to the student that proof is incomplete. Your suggested better proof containing the following, AD . DB = AD . DB + CD^2 = CB^2, is unintelligible. Query III.: (*a*) Same proof holds whether DE is greater or less than DB, and the reader is expected to look into this for himself. (*b*) Yes, your solution is all right for the conditions named by you. Query IV.: We try as far as possible to avoid *apparent* equalities in figures, when such are not given. As to the other query, your solution is probably the best possible.

Bike.—In any oval curve the maximum or minimum chord which is normal at one end is either a radius of curvature at that end or normal at both ends.

Let $y = f(x)$ be the equation to the oval curve.

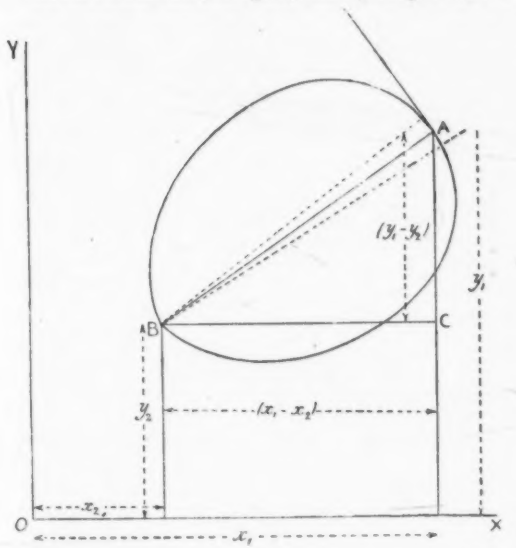
Let (x_1, y_1) be the point A from which the normal is drawn, and let (x_2, y_2) be the opposite point B in the oval intersected by this normal.

The geometrical tangent to the curve at the point A will make an angle ϕ with the axis of x such that

$$\tan \phi = \frac{dy_1}{dx_1},$$

where $\frac{dy_1}{dx_1}$ denotes the value of $\frac{dy}{dx}$ at the point A, defined by the co-ordinates x_1, y_1.

Let the normal AB (see figure) make an angle θ with the



axis of x. Then AB will make an angle $(\theta - \phi)$ with the tangent at the point A.

$$\tan(\theta - \phi) = \frac{\sin(\theta - \phi)}{\cos(\theta - \phi)} = \frac{\sin\theta\cos\phi - \cos\theta\sin\phi}{\cos\theta\cos\phi + \sin\theta\sin\phi}$$

$$= \frac{\tan\theta - \tan\phi}{1 + \tan\theta\tan\phi}.$$

Since AB is at right angles to the tangent at A,

$$\frac{\tan\theta - \tan\phi}{1 + \tan\theta\tan\phi} = \infty.$$

$$\therefore 1 + \tan\theta\tan\phi = 0. \quad \therefore \tan\theta = -\frac{1}{\tan\phi} = -\frac{1}{\frac{dy_1}{dx_1}}.$$

Further, $\theta = \pi + \angle$ ABC, since the direction from A to B is the reverse of the direction from B to A, or BA makes an angle of π with AB.

$$\therefore \tan\theta = \tan \text{ABC} = \frac{y_1 - y_2}{x_1 - x_2}.$$

$$\therefore \frac{y_1 - y_2}{x_1 - x_2} = -\frac{1}{\frac{dy_1}{dx_1}}. \quad . \quad . \quad . \quad . \quad . \quad . \quad (1).$$

(1) expresses the condition that the line AB is normal to the oval curve at the point A.

The distance AB, which is to be a maximum or minimum, is given by

$$\{(x_1 - x_2)^2 + (y_1 - y_2)^2\}^{\frac{1}{2}}.$$

$$\therefore (x_1 - x_2)^2 + (y_1 - y_2)^2 = \text{maximum or minimum} \quad . \quad (2).$$

Since B is a point on the curve, we must have $y_2 = f(x_2)$. On the other hand, x_2 will vary as the point A is shifted; and since the point A becomes definitely known when x_1, the abscissa of that point, is substituted in the equation of the curve, it is plain that x_2 must depend for its value on x_1; in other words, x_2 is a function of x_1.

Differentiating (2) with respect to x_1, and equating the result to zero, we determine the condition that AB should have a maximum or minimum value.

$$2(x_1 - x_2)\left(1 - \frac{dx_2}{dx_1}\right) + 2(y_1 - y_2)\left(\frac{dy_1}{dx_1} - \frac{dy_2}{dx_2}\cdot\frac{dx_2}{dx_1}\right) = 0.$$

$$\therefore \frac{dx_2}{dx_1}\left((x_1 - x_2) + (y_1 - y_2)\frac{dy_2}{dx_2}\right) = (x_1 - x_2) + (y_1 - y_2)\frac{dy_1}{dx_1}.$$

Dividing through by $(x_1 - x_2)$,

$$\frac{dx_2}{dx_1}\left(1 + \frac{y_1 - y_2}{x_1 - x_2}\cdot\frac{dy_2}{dx_2}\right) = 1 + \frac{y_1 - y_2}{x_1 - x_2}\cdot\frac{dy_1}{dx_1}.$$

Substituting the value of $\frac{y_1 - y_2}{x_1 - x_2}$ from 1, we have

$$\frac{dx_2}{dx_1}\left(1 - \frac{1}{\frac{dy_1}{dx_1}}\cdot\frac{dy_2}{dx_2}\right) = 1 - 1 = 0. \quad . \quad . \quad . \quad . \quad (3).$$

The equation (3) is satisfied by

$$\frac{dx_2}{dx_1} = 0 \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (4).$$

$$1 - \frac{1}{\frac{dy_1}{dx_1}}\cdot\frac{dy_2}{dx_2} = 0. \quad \therefore \frac{dy_2}{dx_2} = \frac{dy_1}{dx_1}. \quad . \quad . \quad . \quad (5).$$

For (4) to hold, x_2 must not vary when x_1 is increased or decreased by dx_1.

For (5) to hold, the geometrical tangent at the point B must be parallel to that at A; and since the latter is perpendicular to AB, the former must also be perpendicular to AB. In other words, AB is normal at both ends to the oval curve.

From (1),

$$(x_1 - x_2) + (y_1 - y_2)\frac{dy_1}{dx_1} = 0.$$

This relation must hold for all values of x, and the corresponding values of x_2 and y_2. Hence we may differentiate with respect to x, and equate the result to zero. Doing this, we get

$$1 - \frac{dx_2}{dx_1} + \left(\frac{dy_1}{dx_1} - \frac{dy_2}{dx_2}\cdot\frac{dx_2}{dx_1}\right)\frac{dy_1}{dx_1} + (y_1 - y_2)\frac{d^2y_1}{dx_1^2} = 0.$$

Substituting the condition given in (4), we get

$$1 + \left(\frac{dy_1}{dx_1}\right)^2 + (y_1 - y_2)\frac{d^2y_1}{dx_1^2} = 0. \quad . \quad . \quad . \quad . \quad (6).$$

From (1) and (2),

$$(y_1 - y_2)\left(1 + \left(\frac{dy_1}{dx_1}\right)^2\right)^{\frac{1}{2}} = \text{length of maximum or minimum chord AB.}$$

Substituting the value of $(y_1 - y_2)$ from (6), we have length of maximum or minimum chord AB

$$= \frac{\left\{1 + \left(\frac{dy_1}{dx_1}\right)^2\right\}^{\frac{3}{2}}}{\frac{d^2y_1}{dx_1^2}}.$$

The quantity to the right of this equation is the well-known expression for the radius of curvature at the point (x_1, y_1).

Hence, when the point B does not vary with x_1, it must be the centre of curvature for the curve at A. (See Figure.) In other cases, AB must be normal to the curve at both ends.

The above problem has been solved as an exercise in the differential calculus. It admits of a much simpler solution, without using the calculus at all. This may be left as an exercise to the student.

Porth, R.S.O.—Explain how to solve two equations of the forms

$$ax + \frac{b}{y} = c; \; py + \frac{q}{x} = r.$$

(U.C.C., Stage 2, Mathematics.)

From one equation get y in terms of x. Substitute this value of y in the other equation. We thus obtain an equation in x, from which x may be found. In the above case, from the second equation we get

$$y = \frac{1}{p}\left(r - \frac{q}{x}\right) = \frac{rx - q}{px}. \quad . \quad . \quad . \quad . \quad (3).$$

Substituting this value of y in the first equation, we get

$$ax + \frac{bpx}{rx - q} = c.$$

$$arx^2 + (bp - aq)x - c(rx - q) = 0,$$

$$\text{or } arx^2 + (bp - aq - cr)x + cq = 0.$$

Solve this quadratic equation in the ordinary way for x; then by substituting in equation (3) each of the two values of x thus found, the two corresponding values of y which satisfy the given equation may be obtained.

Rex.—I have four black balls (exactly alike), and also one red, one white, one green, and one blue ball. In how many ways can I make up a row of four balls, no two rows being alike?

(Cambridge Senior, 1887.)

For convenience let us denote the balls by a, a, a, a, b, c, d, e, respectively.

The rows may be of four classes:—

1. Four balls alike.
2. Three alike, one different; for example, $aaab$.

3. Two alike, the other two different; for example, *aabc*.

4. All different; for example, *acde*.

(1.) Obviously only one row—namely, *aaaa*.

(2.) We can *select* four groups, one containing *b*, one *c*, one *d*, and one *e*. Each one of these four groups can be *arranged* in four ways, since the *different* ball can be put either first, second, third, or fourth in the row.

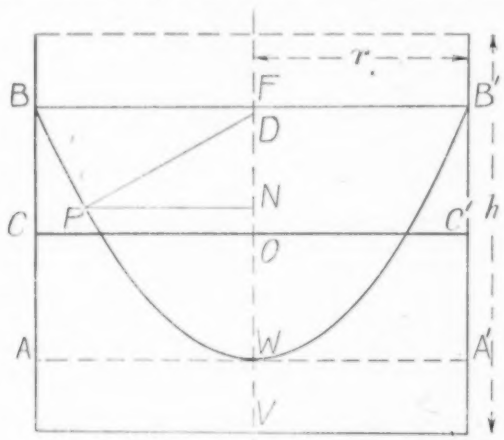
Altogether, therefore, we can make $4 \times 4 = 16$ different rows of this class.

(3.) We can select ${}_4C_2 = 6$ groups, each one of which can be arranged in $\frac{|4}{|2} = 12$ ways. There are thus $6 \times 12 = 72$ rows of this class.

(4.) ${}_5P_4 = 120$ rows of this class.

Total number of different rows $= 1 + 16 + 72 + 120 = \underline{209}$. Ans.

Puzzled.—A cylindrical vessel, open at the top, is half full of water. Find how rapidly it must be spun about its axis in order (*a*) that the water may be on the point of escaping, (*b*) that the centre of the base may be just uncovered. (R.U.I., 1900.)



Suppose the vessel be rotating with any angular velocity ω. CC is the original level of the liquid. The figure shows a vertical section through the axis of the cylinder. First investigate the form of the surface of the water.

The forces acting on a particle of mass m at P are—

1. mg, vertically downwards.
2. $m\omega^2$PN, horizontally outwards.
3. The fluid pressure at P, acting normal to the surface.

These forces are proportional to the sides of the triangle of forces PND. Hence we have

$$\frac{mg}{m\omega^2 PN} = \frac{DN}{PN}.$$

$$\therefore DN = \frac{g}{\omega^2}.$$

$\therefore$ DN is constant. But this is a property of the parabola. Hence the surface of the water is a *paraboloid of revolution*. Now the volume of a paraboloid is half that of its circumscribing cylinder.

$\therefore$ volume BWB′ $= \frac{1}{2}\pi r^2$FW.

But volume BWB′ = volume BAWA′B′

$= $ volume CAWA′C $= \pi r^2$OW.

$\therefore$ OW $= \frac{1}{2}$FW.

Hence the vertex W *falls as much below the original level as the edge* B *rises above it.*

In the given problem it therefore follows that when condition (*a*) is satisfied, (*b*) will be also.

It is a property of the parabola that $BF^2 = 4a$. FW, where a is a constant—namely, $\frac{DN}{2}$.

Hence $BF^2 = 2DN$. FW.

But $DN = \frac{g}{\omega^2}$.

$$\therefore BF^2 = \frac{2g}{\omega^2}.FW.$$

Which gives $\omega^2 = 2g.\frac{FW}{BF^2} = \frac{4g.OW}{r^2}$.

When the vertex of the parabola is at V, we have

$$\omega^2 = \frac{4g.OV}{r^2} = \frac{2gh}{r^2}.$$

Bike.—Show that the chord of a given curve, which passes through a given point and cuts off a maximum or minimum area, is bisected at the point.

Draw a figure. Call the given point P.

Let MPM′ be a chord which cuts off a minimum or maximum area.

Now take points L and N on the curve, on opposite sides of M, such that the areas cut off by the chords LPL′ and NPN′ (L′ and N′ being on the curve) are equal.

The triangle LPN is thus equal in area to the triangle L′PN′, and we have

$\frac{1}{2}$LP. PN sin LPN $= \frac{1}{2}$L′P. PN′ sin L′PN′.

If now we bring L and N nearer and nearer to M, this equation ultimately becomes $MP^2 = M'P^2$, which proves the proposition.

K. A. Maclean.—A person buys 6 per cent. bonds, the interest on which is payable yearly, and which are to be paid off at par three years after the time of purchase. If money be worth 5 per cent., what price should be given for the bonds?

Ans. £103, 6s. 10·26d.

(Pendlebury's *Arithmetic*, p. 255.)

The man pays down a certain fixed sum—namely, the price of the bond. In return for this he receives £6 at the end of one year, £6 at the end of two years, and £6, together with £100, at the end of the third year. Find the present value (assuming *simple* interest at 5 per cent.) of each of these amounts, then the sum of the three present values will give the price which should be paid.

Present value of £6 payable at the end of one year

$$= \frac{6 \times 20}{21} = £5,\ 14s.\ 3{\cdot}428d.$$

Present value of £6 payable at end of two years

$$= \frac{6 \times 20}{22} = £5,\ 9s.\ 1{\cdot}090d.$$

Present value of £106 payable at end of three years

$$= \frac{106 \times 20}{23} = £92,\ 3s.\ 5{\cdot}739d.$$

Adding these, we get £103, 6s. 10·26d. Ans.

Fairfax.—Give some simple examples of "the principle of virtual work."

Two forces P and Q, acting at a point, make angles α, β with the resultant R. Show, from the principle of virtual work or otherwise, that, whatever value be given to the angle ϕ,

$$R \cos(\alpha + \phi) = P \cos\phi + Q \cos(\alpha + \beta + \phi).$$

Any text-book on mechanics will give what is called the principle of virtual work or virtual velocities.

In the given question, the application to two or more forces acting at a point is required. Thus, two or more forces acting on a particle may be replaced by their resultant; and the principle of virtual work states that the algebraical sum of the work done by all the forces, due to any slight displacement, is equal to the work done by their resultant.

At any convenient point O draw two lines OP and OQ; complete the parallelogram, so obtaining R, the resultant of P and Q. Let the angle between P and the resultant R be α, and between R and Q be β. Next draw any line OM, making an angle ϕ with OP.

Imagine the point O to have a displacement OM. The work done by P will be the resolved part of P, in the direction OM, multiplied by the displacement OM.

The angle between the line OQ and the line OM is $(\phi + \alpha + \beta)$; hence the work done by Q is Q cos $(\phi + \alpha + \beta)$. But the work done by the two forces during any small displacement is equal to the work done by their resultant, and the work done by the resultant is R cos $(\phi + \alpha)$.

Hence $R \cos(\alpha + \phi) = P \cos\phi + Q \cos(\alpha + \beta + \phi)$.

Pelagius.—Explain how to calculate the pressure at a point in a liquid contained in a vessel which is moving *vertically* with—

(*a*) Constant velocity.

(*b*) Constant acceleration.

The pressure p at any point in a liquid is given by

$$p = wh + p_0,$$

where h is the depth of the point below the free surface, w is the weight of unit volume of the liquid, and p_0 is the pressure of the atmosphere.

If p_0 be neglected, then $p = wh$ . . . . . (1).

Equation (1) gives the pressure when the fluid is at rest or moving with constant velocity.

When moving with constant acceleration.

(*b*) The force F, when any mass m is moving with acceleration a, is given by the equation $F = ma$.

Thus, given the acceleration a, as w is the weight of unit volume, its mass is $\frac{w}{g}$.

Hence $F = \frac{w}{g}a$.

Hence equation (1) becomes $p = wh \pm \frac{w}{g}a$, the positive sign denoting the force when the acceleration is vertically upwards, and the negative sign when it is vertically downwards.

Bobs.—A particle starting from rest slides down a smooth inclined plane of length l. Show how to divide l into two parts, so that the times of describing them by the particle shall be equal, gravity being the only force acting.

The space S, described in a time t, by a body with uniform acceleration g, is given by $S = \frac{1}{2}gt^2$ . . . . . (1).

When the body is sliding down an inclined plane, at an inclination α to the horizon, the space described in a time t is obtained by writing $g \sin \alpha$ for g in (1).

As l denotes the length of the plane, let l_1 denote one of the required parts. Then we have

$$l = \tfrac{1}{2}g \sin \alpha \, t^2.$$

$$\therefore t = \sqrt{\frac{2l}{g \sin \alpha}} \quad . . . . . (3).$$

$$\text{Also } l_1 = \tfrac{1}{2}g \sin \alpha \, t_1^2 \quad . . . . . (4).$$

But $t_1 = \frac{1}{2}t$.

Hence, from (3), $t_1^2 = \frac{l}{2g \sin \alpha}$.

Substitute this value in (4).

$$\therefore l_1 = \tfrac{1}{2}g \sin \alpha \times \frac{l}{2g \sin \alpha}$$

$$= \frac{l}{4}.$$

Hence the two parts are one-quarter and three-quarters the length of the plane respectively.

(See Rule 1, Query Column. Other solution will appear in next issue.)

Shirebrook.—A particle is attracted, according to the law of the inverse square of the distance, towards each of two fixed centres. If the absolute forces of attraction be μ and ν respectively, determine the equation of the surface on which the particle will remain at rest in every position.

Let A and B denote the two fixed centres; P a point on the given surface.

Assume that the equation of the surface can be expressed in the form $f(r_1r_2) = C$.

Now, force along PA is $\frac{\mu}{r_1^2}$, and along PB is $\frac{\nu}{r_2^2}$.

For these forces to have a normal resultant, which is the condition for particle to be at rest on the surface, we must have

$$\frac{\mu}{r_1^2}\delta r_1 + \frac{\nu}{r_2^2}\delta r_2^2 = 0,$$

from principle of virtual work.

$$\text{But } \frac{\partial f}{\partial r_1}\delta r_1 + \frac{\partial f}{\partial r_2}\delta r_2 = 0.$$

$$\therefore \frac{\partial f(r_1r_2)}{\partial r_1} = k\frac{\mu}{r_1^2} \quad . . . . . (1).$$

$$\text{And } \frac{\partial f(r_1r_2)}{\partial r_2} = k\frac{\nu}{r_2^2} \quad . . . . . (2).$$

From (1) we get $f(r_1r_2) = -k\frac{\mu}{r_1} + \phi(r_2)$.

$$\therefore \frac{\partial f(r_1r_2)}{\partial r_2} = \frac{\partial \phi(r_2)}{\partial r_2}.$$

$$\text{But } \frac{\partial f(r_1r_2)}{\partial r_2} = k\frac{\nu}{r_2^2}.$$

$$\therefore \frac{\partial \phi(r_2)}{\partial r_2} = \frac{k\nu}{r_2^2}.$$

$$\therefore \phi(r_2) = -\frac{k\nu}{r_2}.$$

$$\text{Hence } f(r_1r_2) = -k\left(\frac{\mu}{r_1} + \frac{\nu}{r_2}\right).$$

$$\therefore \text{ equation of curve is } \frac{\mu}{r_1} + \frac{\nu}{r_2} = -\frac{C}{k}.$$

And the surface is one of revolution, formed by the revolution of this curve about AB.

J.G.D.—As any good modern text-book on statics and dynamics contains all that is required for the Intermediate Science Examination, it is difficult to select those which are most suitable. Probably Loney's *Elements of Statics*, *Elements of Dynamics*, and *Elements of Hydrostatics* will answer all your requirements.

The books on the subject published by the University Correspondence College Press are supposed to cover the whole course—that is, *Tutorial Dynamics* and *Hydrostatics*—and are largely used for the purpose. You can see the books named in many places, and select those most suitable.

Falstaff.—A locomotive draws a load of 200 tons. Find the pull needed (1) at a constant speed, if the friction is ·05 of the load; (2) if the friction is the same, and the speed rises from 30 feet per second to 60 feet per second in one minute. ($g = 32$.)

(1) Let F denote the force; then $F = \mu W$.

$$\therefore F = 200 \times 2240 \times \cdot 05$$

$$= 22{,}400 \text{ lbs. weight.}$$

(2) Assuming that the acceleration is uniform, then as the speed increases from 30 feet to sixty feet in one minute, the acceleration is 30 feet in one minute, or $\frac{1}{2}$ foot per second per second.

Force = mass × acceleration

$$= \frac{200 \times 2240}{32} \times \tfrac{1}{2}$$

$$= 7000 \text{ lbs.}$$

Hence total force = 22,400 + 7000 lbs.

= 29,400 lbs. weight.

Birt.—A rod floats upright, partially immersed in a homogeneous liquid. Prove that a small increase of atmospheric pressure will produce a small rise of the rod proportional to the square of the length of the immersed portion.

In all cases the source from which a query is obtained should be stated. When this is done it enables the query to be verified, and any mistake corrected. In the present case the query is obviously wrong. The rise is proportional *not* to the square, but simply to the length of rod immersed.

Let the density of the rod be denoted by r, the density of the liquid by s, and that of the air by d.

When a small increase of atmospheric pressure occurs, the density of the air may be denoted by $d + \delta$.

If x and y denote the lengths of the rod immersed in and above the liquid respectively when the density of the air is d, then, when the density of the air becomes $d + \delta$, these become $x - \gamma$ and $y + \gamma$ respectively, where γ is the rise of the rod.

If A denotes the area of cross section of the rod, then the usual conditions of equilibrium furnish the following equations:—

$$xAs + yAd = (x + y)Ar.$$

$$\text{Also } (x - \gamma)As + A(y + \gamma)(d + \delta) = (x + y)Ar.$$

Dividing each equation all through by A, we obtain

$$xs + yd = (x + y)r \quad . . . . . (1).$$

$$\text{And } (x - \gamma)s + (y + \gamma)(d + \delta) = (x + y)r.$$

$$\text{Or } xs - \gamma s + yd + \gamma d + y\delta + \gamma\delta = (x + y)r \quad . \quad (2).$$

Subtracting (2) from (1),

$$\gamma s - y\delta - \gamma d - \gamma\delta = 0.$$

The term $\gamma\delta$, the product of two very small quantities, may be neglected.

$$\text{Hence } \gamma s - y\delta - \gamma d = 0.$$

$$\text{Or } \gamma(s - d) = y\delta.$$

$$\therefore \gamma = \frac{y\delta}{s - d} \quad . . . (3).$$

It is seen from (3) that the rise of the rod is proportional to y, the length outside the liquid.

Ciris.—You may take any stage you choose, whether or not you have previously passed in any other stage.

Joe, *W.H.W.*, and *B.B.S.* may have solutions by post. A post card, giving name and address, should be sent to editor.

W.E.B., *Timothy*, *May*, next month.

OUR SCIENCE SECTION

☛ **Subscribers requiring Explanations of Difficulties in any branch of Science, or Advice upon Courses of Study, can obtain all help required by communicating with the Editor, and accompanying their query with the Coupon cut from this Number.**

CHEMISTRY NOTES.

BY THOMAS CARTWRIGHT, B.A., B.SC. (LOND.),
First Class Honoursman in Chemistry.

Alcoholates of Aluminium.—M. Tcitchenko has studied the action of aluminium amalgam on primary, secondary, and tertiary alcohols. All univalent alcohols are able to react on aluminium amalgam, giving alcoholate $Al(OK)_3$, the essential condition of the reaction being that both the alcohol and the alloy must be free from water. The speed and ease of the reaction depend on the nature of the alcohols. As a general rule, the primary alcohols react more easily than the secondary, and the secondary than the tertiary. The tendency for the alcoholates to crystallise is only slightly remarked in the compounds formed from the normal primary alcohols, but becomes more and more apparent as the number of molecules of CH_2 increases; the aluminates of the isobutyric and isopropylic alcohols can, however, be obtained in fairly large crystals from their solutions in benzene or toluene. The formula $Al(OK)_3$ has been established by cryoscopic determinations.

Double Fluoride of Silver and Ammonium.—Herr Grützner has prepared this body by dropping Ag_2O, freshly prepared by the action of NaOH (free from chloride), into a concentrated solution of commercial ammonium fluoride (NH_4F), as long as any of the oxide is dissolved. On cooling the solution to 0° C., crystalline needles are deposited to the extent of 2 grams for every 50 grams of Ag_2O employed. These are washed with distilled water and dried with blotting-paper, whilst being kept cool and remote from the light. Analysis shows that they consist of the double salt $2NH_4FAgFH_2O$.

Indium: Its Place in the Periodic Table.—MM. Chabric and Rengade have obtained double sulphates of indium with the two well-defined alkali metals cæsium and rubidium, a fact which justifies the placing of indium amongst the metals that give sesquioxides. The property possessed by the hydrate of the element of dissolving in the alkalis places it nearer aluminium than iron (compare sodium aluminate). It is also worthy of remark that indium acetyl-acetonate, so well defined and beautifully crystalline, is not volatile, and so cannot be used to determine the atomicity of indium. This latter fact brings indium nearer to iron, and removes it farther from aluminium, since the acetyl-acetonate of aluminium is volatile without decomposition.

The Union of Hydrogen and Chlorine.—Mr. Mellor, B.Sc., communicated a paper on this subject to a recent meeting of the Chemical Society. The electrolysis of hydrochloric acid and of the solution of chlorine in this acid was first studied, as an exact knowledge of this is necessary to interpret the work of previous investigators.

Bunsen and Roscoe state that, under certain conditions, the gas resulting from the electrolysis of hydrochloric acid consists of a practically pure mixture of hydrogen and chlorine. The author, however, finds that, under the most favourable conditions, oxygen is present to the extent of 0·009 per cent.

In order to find out if the distribution of the gases in Bunsen and Roscoe's isolation vessel is affected by the absorption of hydrogen chloride, a more complete investigation was made. By plotting the respective amounts of chlorine and hydrogen chloride in the solution, it is found that two distinct and intersecting curves appear:—(1.) If the hydrochloric acid be less than one-fifth of normal strength, the amount of chlorine absorbed decreases as the amount of hydrogen chloride increases. The explanation is based on Jakowkin's work on the distribution ratio of chlorine between water and carbon tetrachloride, where the action of chlorine on water (in darkness) is shown to be a trimolecular one—

$$Cl_2Ag(\overset{+}{H} + Cl + HOCl)Ag.$$

The number of $\overset{+}{H}$ and Cl ions is evidently increased by the addition of hydrogen chloride; and, therefore, in agreement with Nart's distribution law, the number of ions derived from the chlorine is diminished. This involves a decrease in the solubility of the gas. (2.) If the strength of the solution of hydrochloric acid is greater than one-fifth of the normal, the amount of chlorine absorbed *increases* as the amount of hydrogen chloride increases. The phenomenon is probably due to the formation of a compound of hydrogen chloride with the chlorine, say HCl_3. There is no sharply-defined point of transition, because the phase $\overset{+}{H} + \overset{-}{Cl} + HCl_3$ coexists in the solution.

A slight contraction occurs when chlorine and hydrogen chloride gases are allowed to diffuse into each other.

Some Alloys of Sodium and Potassium.—Mons. N. S. Kourmakow has produced some interesting alloys of the above metals with mercury, cadmium, lead, and bismuth. The temperature of fusion was ascertained whilst employing varying quantities of the different metals. In the case of the alloy sodium-mercury no less than seventy-five experiments were carried out, each with a different proportion of the components. The maxima of temperatures obtained were remarkably high, being 346° C. in the case of sodium and mercury, and 269·7° C. in the case of potassium and mercury; and the composition of the alloy corresponding to these temperatures is exactly represented by the formulæ $NaHg_2$ and KHg_2. The freezing-point depression curves that proceed from these temperature maxima are shown to extend through large temperature intervals. In the case of $NaHg_2$ the curve extends from 346° C. to 218° C. on addition of sodium, and to 155° C. on addition of mercury. The combinations of sodium with cadmium, lead, and bismuth are also distinguished by very high temperature maxima, these being respectively 395°, 420°, and 720° C., whereas the melting points of the pure metals are: Na 96°, Cd 322°, Pb 326°, and Bi 268° C. These characteristic temperatures correspond exactly with the formulæ $NaCd_2$, Na_2Pb, and Na_2Bi. Similar phenomena have been observed with respect to the combinations aluminium-gold, aluminium-antimony, and the writer concludes that in these latter the aluminium functions as an alkali metal, giving rise to the same peculiarities as sodium and potassium in the alloys investigated by himself.

The Manufacture of Borax.—The text-books usually give the method of double decomposition between boric acid and sodium carbonate as the process whereby the borax of commerce is obtained, whereas, as a matter of fact, by far the greater amount of borax that is made in Europe is made from *borocalcite*, a mineral consisting chiefly of calcium borate, $Ca_2B_6O_{11}$, and which is found in Asia Minor in considerable quantities. Borocalcite is reduced to a fine powder in a mill. Fifteen parts by weight thereof mixed with sixty parts by weight of water are placed in a vessel heated by steam, and ten parts of sodium carbonate are further added, the whole being boiled for about three hours. The boiled mass is passed into large iron filter-presses, and the hot filtrate is placed in crystallising basins, wherein, during the course of about three days, the borax deposits in crystals, which are put to dry in a steam oven. If, as often is the case, they are in large, irregular masses, they are broken up after having been well cleaned. The small lumps are next packed in barrels weighing from 100 to 800 lbs. The cake of carbonate of lime which remains in the filter-press is washed with water to dissolve out the whole of the borax, after which it is sold to glass, paper, or cement works. From 100 lbs. of borocalcite it is estimated that 100 lbs. of crystallised borax may be obtained.

The Oxidising Values of the Alkaline Persulphates and of H_2O_2.—Herr Grützner uses As_2O_3 as a reagent for estimating the oxidising values of these two substances, the reaction with the persulphate being—

$$2K_2(SO_4)_2 + As_2O_3 + 2H_2O = As_2O_5 + 2K_2S_4O + 2H_2SO_4.$$

The operation is carried out in warm ordinary alkaline or

ammoniacal solution. It is slower in acid solution. A decinormal solution of As_2O_3 is used, the excess of which is estimated by a decinormal solution of I. The evaluation of H_2O_2 is made in the same way, and gives results concordant with those furnished by the $K_2Mn_2O_8$ method, thus—

$$As_2O_3 + 2H_2O_2 = As_2O_5 + 2H_2O.$$

The author has not succeeded in his efforts to titrate Na_2O_2 by the same method; the evolution of oxygen caused by this body is too rapid for the gas to combine integrally with As_2O_3 at the moment of being set free.

Phosphide of Mercury and Compounds of Phosphonium.—Herrn Partheil and Van Haaren failed to prepare phosphide of mercury (P_2Hg_2) by reacting with PH_3 on $HgCl_2$ either in the dry state or in solution; they were therefore obliged to have recourse to Granger's method, which consists of reacting with P_2I_4 on Hg. By heating the P_2Hg thus obtained with C_2H_5I in sealed tubes to 160°, the body $P(C_2H_5)_4I2HgI_2$ is obtained. This compound treated with Ag_2O gives the hydrate of tetrethylphosphonium—

$$2[P(C_2H_5)_4I + 2HgI_2] + 5Ag_2O + H_2O = 2P(C_2H_5)_4OH + 10AgI + 4HgO.$$

The base thus formed, when treated with HCl, gives the compound $P(C_2H_5)_4Cl$, which combines with $HgCl_2$, forming $P(C_2H_5)_4Cl_2HgCl_2$, and with $PtCl_4$ giving $[P(C_2H_5)Cl]2PtCl_4$. By heating CH_3I and P_2Hg_3 in sealed tubes to 150°, we obtain $P(CH_3)_4I2HgI_2$; then, from this successively, $P(CH_3)_4ClHgCl_2$, $[P(CH_3)_4Cl]_2PtCl_4$, and $P(CH_3)_4ClPtCl_3$.

PHYSIOGRAPHY

(ADVANCED AND HONOURS).

Geological Time.—Diverse views upon this subject are so common that it will be well to put on record a short summary of the most noteworthy of these; hence this note.

Mr. Gilbert looks to the climatic changes consequent upon the precession of the equinoxes as supplying the most reliable data for the required calculation. Contrasted phases of climate would thus occur every 10,500 years, and the strata should furnish evidence of such phases. Indications of moist or dry climates, of the increase or decrease of glaciers, and of the local fluctuations of sea-level, as affecting the character and extent of strata, are the indices to which this observer would appeal.

Professor Joly argues from the amount of sodium at present contained in the oceans, and the amount annually supplied by rivers, sodium being the only dissolved element of which the oceans have retained substantially the whole amount committed to them by the solvent denudation of geological time. As already stated in a previous note, Professor Joly gives a period of between eighty and ninety millions of years as the probable age of the earth, judged from this standpoint.

Professor Dubois deals with the question from the point of view of the circulation of carbonate of lime; and he is of opinion that the lapse of time since the formation of a solid crust and the appearance of life upon the earth may be more than a thousand million years.

Mr. J. G. Goodchild put forth in 1897 the view that the most reliable calculation could be made as to the time of formation of marine strata by a study of the deposits of organico-chemical origin; and he concluded that over seven hundred million years would be required since the commencement of the Cambrian period. It is in connection with the views of Mr. Gilbert and Professor Joly that most hope as to a reliable solution of this interesting problem may be indulged in.

Sun-spot Minimum.—The following figures, expressing in millionths of the sun's hemisphere the portion covered with spots during the past eleven years, will be assurance doubly sure of the eleven-year spot period of waxing and waning. The figures are based upon photographs taken by observers at Greenwich, Mauritius, and the West Indies.

1889.....78.	1893.....1464.	1897.. ....514.
1890.....99.	1894.....1282.	1898.....375.
1891.....569.	1895.....974.	1899.....150.
1892.....1214.	1896.....543.	1900.....100 (about).

Heat from the Stars.—Mr. E. F. Nicholls, an American astronomer, has had this question of the heat received from the stars under special consideration — the first-magnitude star Arcturus, of the constellation Boötes, which may easily be found by continuing the curved tail of the Great Bear, and Vega (α Lyræ), having been under particular examination in this connection. The apparatus employed was a very sensitive radiometer, the invention of which was due to the observer himself. A standard candle, placed at a distance of 9 kilometres, equals Arcturus in heat-giving, so far as we are concerned; and the same candle, at a distance of 20 kilometres, will have the same heat effect upon the observer as Vega.

Festoon Cloud.—M. Greville gives in *La Nature* a description of this interesting form of cloud, which was first observed by Lamarck a century ago. In appearance, this somewhat rare form of cloud resembles a *reversed cumulus* cloud. It has been named by the International Cloud Committee the *mammato-cumulus*. Opinion was pretty unanimous, prior to the work of M. Greville, that the *mammato-cumulus* was formed of drops of water; but the French observer, whilst admitting that some festoon clouds are undoubtedly of this description, yet maintains that often the cloud is composed of minute ice-needles, and he suggests that the term *mammato-cirrus* or *globe-cirrus* should be employed in place of the name chosen by the International Cloud Committee, when it is clear that the cloud is formed of ice-crystals.

Perturbations of Eros produced by Mars.—Mr. H. N. Russell has recently published the results of an extensive investigation of the perturbations of the major axis of the orbit of Eros by the action of Mars (*Astronomical Journal*, vol. xxi., No. 484). As the periods of the two planets are nearly equal, and their orbits interlock, the disturbing force will in consequence vary greatly in magnitude, and may have any direction whatever. Also, as Eros is sometimes nearer the sun than Mars, and sometimes more remote, the development of the perturbative function, proceeding by powers of the ratio of their radii vectors, gives rise to a *divergent* series; and as the magnitudes of the eccentricities and inclinations make development in ascending powers of these quantities undesirable, methods based upon mechanical quadrature are preferable.

The present investigation has been made by Le Verrier's method of interpolation. Newcomb's elements of Mars have been used, those of Eros being original computations. The chief results obtained are that—(1) the "great inequality" of period of about a thousand years will not affect the place of Eros sensibly during the next dozen years; (2) the perturbations of moderately long period are much the largest produced by Mars on any planet. They may displace Eros by as much as 90° in mean longitude; and since, at a perihelion-opposition, any change in the mean longitude of Eros produces one *ten* times as great in its geocentric longitude, the measurement of this displacement will eventually lead to a valuable determination of the mass of Mars.

Climatological Table of the British Empire for the Year 1899.—The December number of Symon's *Meteorological Magazine* summarises the climatological tables that have been collected from select stations for a quarter of a century, showing that, generally speaking, the extreme values fall much to the same stations as usual. Adelaide records the maximum shade temperature—namely, 113·6° in February. This temperature has only once been exceeded in these tables—namely, by 114·2° in 1876. The same place had also the maximum reading in the sun—namely, 175·7°; a temperature also unusual, the only higher reading being 180° in 1882. Adelaide is also the driest station, the mean humidity being 59. The dampest station was Colombo, with a mean humidity of 79. This same station also records the highest mean temperature—namely, 81·9°—as well as the greatest rainfall, 73·5 inches. The lowest temperature in the shade was −46·5° in February at Winnipeg, to which station must also be given the greatest temperature range of the year—namely, 135·9°—as well as the greatest mean daily range, 22·3°, and the lowest mean temperature, 34·2°. Mauritius was the cloudiest station—namely, 5·7, which extreme has, however, been several times recorded in London; but in 1899 the cloud value for the metropolis was only 5·6, a value lower than any except three of the preceding forty years.

New Minor Planets.—Mr. W. R. Brooks of New York has discovered, by means of photographs, three new planetoids, situated within one degree of Eros. The brightest of the three is somewhat brighter than Eros, whilst the other two are less bright than De Witt's planetoid.

The Eclipse of 1900 from the Spanish Standpoint.—Señor Iniquez has just published some interesting particulars of the eclipse of the sun on May 28, 1900, as seen by Spanish observers. Five excellent photographs of the corona were obtained, three with the larger and two with the smaller coronograph. It is remarked that the principal prominences were unconnected with the coronal extensions, and that in one of the photographs the streamers can be traced to a distance of three diameters. For the green coronal line a wave-length of 5207·3 was determined, as compared with Sir Norman Lockyer's 5303·7 and Professor Campbell's 5303·26, as obtained from the photographs of 1898. Shadow-bands were seen a minute and a half before totality, lying in a direction from SW. to NE., and tra-

velling from NW. to SE. with a velocity comparable with that of a man walking briskly, and at a distance apart of 8 cm. During the eclipse the thermometer fell 4° in the shade and 8° in the sun.

Notanda for March.—In the month of March 1900 rain fell on twelve days, the total average fall for the month being 0·90 inch, or 0·50 inch below the average for the preceding fifty years.

On the 21st of March the sun enters Aries, and spring begins at 7 a.m.

Mercury is a morning star in the latter half of the month, and is in inferior conjunction with the sun on the 7th in Aquarius.

Venus is a morning star, and is near the sun at the end of the month when in Aquarius.

Mars is in Leo, about half-way between Regulus and η Leonis, on the 12th of March.

Jupiter is a morning star, rising about two hours before the sun in the SE.

Saturn is a morning star, situated in Sagittarius, not far from Jupiter. At midnight, at the beginning of the month, Ursa Major, Leo, and Hydra are on the meridian.

Virgo comes to the meridian about midnight towards the end of the month.

For star maps, and directions how to find the remainder of the constellations, etc., see "*Section Two*" *Physiography* (Nelson, 2s.).

NOTES ON THEORETICAL MECHANICS.

BY F. CASTLE, M.I.M.E.,

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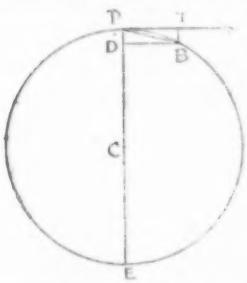
ADVANCED AND HONOURS STAGES.

Uniform Circular Motion.—One of the most important parts of Theoretical Mechanics is the section dealing with motion in a curve, including the special case of uniform circular motion. In the elementary stage it is necessary to be acquainted with the formula $F = \frac{mv^2}{r}$, and also to be able to apply the formula to a simple numerical example. In the advanced and honours stages, in addition, a proof may also be required.

In such a proof it should be clearly made out that the force F acts along the radius towards the centre. In the case where more than one force is acting on the body, the resultant must be obtained. This becomes the force F, and therefore acts along the radius as before. In addition to the *direction*, the *magnitude* of the force must also be obtained.



Let P be a particle of mass m, moving in a circle, centre C, and radius r, with uniform velocity v.

Draw PT, the tangent at B, and PE, a diameter of the circle. Assume a point B near to P, and draw BT parallel to PE, and BD parallel to PT. Join B to P. Then if BP denote the space passed over by the moving point in a small interval of time t, the chord PB is approximately equal to the arc PB, the approximation becoming closer and closer as the interval of time is diminished.

The direction of motion at P is that of the tangent PT. The distance the body is drawn away from PT at the point B is TB or PD.

From the formula $S = vt$, which gives the space passed over by a body moving with uniform velocity v, in a time t, we have

$$PB = vt \quad . \quad . \quad . \quad . \quad . \quad . \quad (1).$$

$$\text{Also, } TB = PD = \tfrac{1}{2}ft^2 \quad . \quad . \quad . \quad . \quad (2).$$

From geometry we obtain the well-known relation

$$PB^2 = PD \times PE.$$

$$\therefore v^2t^2 = \tfrac{1}{2}ft^2 \times 2r.$$

$$\therefore v^2 = fr,$$

$$\text{or } f = \frac{v^2}{r} \quad . \quad . \quad . \quad . \quad (3).$$

As the particle is moving in the circle with constant speed, there is not at any point any acceleration along the tangent, but there is at every point an acceleration along the normal, or radius, of magnitude $\frac{v^2}{r}$.

By Newton's Second Law, wherever there is acceleration there must be force, and the magnitude of the force is obtained by multiplying the acceleration by the mass of the body. Hence, by multiplying each side of Eq. (3) by the mass m, we obtain

$$mf = F = \frac{mv^2}{r} \quad . \quad . \quad . \quad . \quad . \quad (4).$$

When the mass is in pounds, r in feet, v in feet per second, the force F will be obtained in absolute units or poundals. Dividing by g, the force is obtained in pounds.

Denoting the angular velocity of the particle by w, the number of revolutions per second by n, and the time of a revolution by t, then, by the aid of the relations

$$v = wr, \; w = 2\pi n, \; w = \frac{2\pi}{t},$$

it follows by substitution that Eq. (4) may assume any of the following forms:—

$$F = mw^2r = m2^2\pi^2n^2r = \frac{m2^2\pi^2}{t^2}.$$

Ex. 1. A particle whose mass is $\frac{1}{2}$ ounce is fastened to an inextensible string, and is moving in a circle of 5 ft. radius with a velocity of 10 ft. per second. What is the tension in the string?

Here, assuming the motion takes place in a horizontal plane, then, as the mass is $\frac{1}{32}$ lb.,

$$F = \frac{\frac{1}{32} \times 10^2}{5} = \frac{5}{8} \text{ poundals.}$$

Ex. 2. A particle moves with a constant velocity v in a circle of radius r. Show that the normal acceleration is $v^2 \div r$.

Two bodies, A and B, are constrained by equal forces to move in circles. If A's mass is three times B's mass, and the radius of A's circle is twice that of B's circle, show that A will describe its circle in a time which is to the time in which B will describe its circle as $\sqrt{6}$ to 1. (1900.)

Let m denote the mass of B. Then $3m$ denotes the mass of A. If r denote the radius of the circle in which B moves, then $2r$ denotes the corresponding radius of A.

Denote the time taken by A to describe a circle by t, and by t' the time required for B to describe the circle.

From the formula

$$F = \frac{m2^2\pi^2}{t^2},$$

$$F = \frac{3m \times 2 \times 2^2 \times \pi^2}{t^2} = \frac{m \times 2^2\pi^2}{t'^2}.$$

$$\therefore \frac{t^2}{t'^2} = \frac{12m}{2m} = \frac{6}{1}.$$

$$\text{Hence } \frac{t}{t'} = \frac{\sqrt{6}}{1}.$$

Ex. 3. A particle describes the perimeter of a regular hexagon with a constant velocity of 100 ft. a second. Find the magnitude and direction of the velocity that must be communicated to it at the instant it reaches an angular point. (1889.)

Ans. 100 ft. per second towards centre of hexagon.

Ex. 4. A particle whose mass is 10 lbs. is constrained to move in a horizontal circle by a string 5 ft. long fastened to a fixed point. If at any instant the tension of the string is 98 poundals, find the velocity of the particle, and its angular velocity about the fixed point. (1892.)

Ans. 7 ft. per second; 1·4 radians per second.

Ex. 5. A particle of given mass m moves with a constant velocity V in a circle of given radius r. State what is known as to the force F which acts upon the body. Prove the statement.

If a force equal to F makes a particle, whose mass is equal to m, move in a straight line, through what distance must it act to communicate to it a velocity equal to V—F, m, and V being the same as in the first part of the question? (1895.)

Ex. 6. The mass of a particle is 10 lbs.; it is fastened to one end of a thread 6 ft. long, the other end of which is fastened to a fixed point. The particle is made to move in a vertical circle round the point in such a way that it passes through the lowest point of the circle with a velocity of 12 ft. per second. Find the force or forces which at that instant are acting on the particle. Explain whether the "centrifugal force" is one of them. (1898.)

Ex. 7. Investigate an expression for the force acting on a body which has uniform circular motion.

A marble is travelling with uniform velocity 8 ft. per second round the inner surface of a hemispherical bowl whose radius is $\frac{2\sqrt{5}}{5}$ ft., and its path lies in a horizontal plane. Show that its angular distance from the lowest point of the bowl is $\cos^{-1}\frac{1}{3}(3 - \sqrt{5})$. (1900.)

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OUR COMPETITION PAGE

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Report.

The majority of the competitors followed and gave more or less faithful renderings of the reasoning in the piece set for translation. Speaking generally, competitors who did not get into the first class failed to grasp the central idea of the passage. Too many of these did not appear to reflect on the meaning of their English renderings. We could fill the best part of a column with the "bulls" we have underlined. One candidate translates *relève l'être moral*, etc., "relieves the moral being with his own eyes," and another informs us that "every passion is a personal, self-satisfied egotist." Such renderings only serve to show how necessary it is to remind our friends once again that the French passages set have really some definite meaning which competitors, in their own interests, should strive to discover before submitting translations.

French Prize Translation.

All passion is selfish, personal, self-pleasing; the sacrifice of passion is not made without painful emotion. But, at the same time, this sacrifice exalts the moral being in his own eyes, and thence springs a kind of unspeakable, negative pleasure in the approbation that we give to our conduct. It is reason which approves; yet this approval is accompanied by a grave pleasure which we call self-satisfaction, the inward pleasure of the conscience. As we have said, this pleasure, however noble it may be, is not the object of moral action. The true, the only end of moral action must be the accomplishment of law. To propose to oneself as an aim the pleasure of moral approbation is to miss that pleasure; for it only accompanies an act which is worthy of approbation, and which, consequently, has not had that pleasure itself as an end in view. But if the pure law of duty is the only legitimate motive of our actions, may we not add to this disinterested motive that of moral approbation, which, without impairing it, gives it energy, and comes to the help of human frailty? To this question the philosopher Kant replies in the affirmative, but at the same time clearly indicates on what conditions he grants this concession. We are so feeble and so continually assailed by interest and passion, law and reason in their absolute purity act with such little power on the majority of men, that we are permitted to call in the emotions to the help of duty.

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THE EDITOR'S TABLE

THE HISTORY OF HOME RULE IN CANADA.

Canada under British Rule, 1760–1900. (Cambridge University Press Historical Series.) By Sir John G. Bourinot. Of all the fields of human knowledge that the universities are at present cultivating, none is being more assiduously and carefully worked than that of modern history; and the labours of the scholars who are engaged on the volumes of the Cambridge Historical Series are not likely to be the least productive. To the volume dealing with the development of Canada under British rule—that is, from the year 1760—we give a hearty welcome. It is written by a Canadian, and we believe our readers will peruse it with all the greater pleasure that it is largely virgin soil which is being turned over. There can be no better authority than Sir John Bourinot, who, as a Canadian born and bred, a trained journalist and a man of letters, a government official arrived at the high post of Chief Clerk to the Dominion House of Commons, has had absolutely unique opportunities of obtaining a first-hand acquaintance with the conditions of life in the Dominion and the material facts of its political history. Besides an unsurpassed knowledge of the events of Canadian history, of which evidence was given in his books on *The Constitutional History of Canada* and *The Story of Canada*, he has the historian's indispensable gift of impartiality; and whether the point at issue be between French and British, Protestants and Roman Catholics, Free Traders and Protectionists, or Liberals and Conservatives, we feel convinced that the opinions of the writer are those of the impartial judge, safe from the heat of party passion, and free from all suspicion of trying to serve one set of material interests.

The first chapter is devoted to a brief review of the colonisation by the French of the valley of the St. Lawrence, and of the political and social conditions of the settlements at the time of their conquest by the English in 1759. This chapter is perhaps the most interesting in the book—it certainly is so to the general reader—and a great deal of what afterwards happened when the colony had passed under British rule is properly understood only if we keep steadily in mind the circumstances of its early occupation by the French. Although the occupation may be said to date from 1535, it was not till the appearance of the Jesuits, about a century later, that much progress was made in stocking the colony; for the first settlers invariably preferred to follow the fur trade rather than the quieter and less remunerative pursuit of agriculture. In 1663 Louis the Fourteenth made of Canada a royal government; but while the work of exploration went steadily on, and vast stretches of territory were added to the French dominions by explorers, traders, and priests, immigrants from the home land in Europe came in very small numbers—only 6,000 between the years 1663 and 1713—and the total population after a century of colonising was only 20,000. Sir John Bourinot ascribes the failure of French colonisation in Canada to the absolutism of the French *régime*, and the complete absence of anything like representative institutions of government. The people were denied all right of meeting except for purely church purposes: the curé, the seignior, and the militia captain were each petty tyrants in their own spheres, and reflected the absolute character of the imperial rule. There was little education and no enterprise. Before passing on to consider the changed condition of things after the cession of Canada to England in 1759, the author makes the noteworthy remark that the victory of Wolfe on the Heights of Abraham was the prelude to the American Revolution, inasmuch as the New England States felt themselves thenceforth free from all fear of monarchical France as being likely to oppose their republican schemes. In the third chapter the effect of the American Revolution on Canada is discussed, and the chief credit of her remaining loyal to the British Crown is given to the French Canadian clergy, who were deeply sensible of the just treatment their province had always received from Britain, and were naturally distrustful of the thirteen rebel states, the majority of whom were actively hostile to the Roman Catholic religion.

Chapter iv. deals with the beginnings of representative government. Until 1774 the government had been carried on in terms of a proclamation issued by the king, and the authority of the governor was almost absolute; but by the Quebec Act of 1774 it was vested in a governor and a legislative council of twenty-two resident members of the province chosen by the Crown. In 1791 Parliament, at the instance of Pitt, passed an Act dividing the colony into two provinces, Upper and Lower Canada, and establishing in each province a legislative council and an assembly—the former nominated by the Crown, the latter elected by the people.

Chapter v. contains a very clear account of the origin of the war between Britain and the United States, which broke out in 1812, and lasted till 1815. Really originating from the necessities of the situation which the ambitious projects of Napoleon created for Britain, the war seemed to offer the people of the United States a capital opportunity to seize the Canadian territories. But the invasion proved a failure; for the Loyalists of Upper Canada, though vastly inferior in numbers to the invading forces from the States, showed a splendid resistance, and the French people of Lower Canada yielded once again a loyal obedience to their clerical leaders.

The rebellions in Lower and Upper Canada in the years 1837–38 form the subject of the next chapter. Scarcely had the war with the States ended when internal strife began between the government and the legislative assembly in both provinces, and reforms were urgently demanded in the direction of increased powers for the legislatures. The two provinces had also failed to maintain satisfactory relations with each other in regard to the administration of the finances; and although the Imperial Government lent a sympathetic ear to the reformers, the agitation proceeded to treasonable lengths, and the constitution of Lower Canada was temporarily suspended. Rebellion was put down with a firm hand, and in 1841 an Act of the British Parliament once more reunited the Canadas, and at last conceded a large measure of responsible government. The results were in the highest degree beneficial, and the provinces entered on a new career of industrial activity—a career which received still further impulse when the rapid maturing of political conditions brought about another and a wider union "which gave greater scope to the statesmanship of their public men, and opened up a wider sphere of effort to capital and enterprise." The history of this movement, culminating in the establishment of the confederation which we know to-day as the Dominion of Canada, is the subject of the ninth chapter. The concluding chapter contains a short and lucid account of Canada's relations with the United States, and the author shows how the weakness of her former days has been succeeded by a strenuous and successful upholding of those rights and privileges which her more powerful neighbour has on more than one occasion sought to filch from her.

The book closes with the expression of a belief that Canada will yet be united in the bonds of an imperial confederation which promises to be the ultimate realisation of British unity. In spite of the evil prognostications of certain political prophets and philosophic historians, that dream of union seems to be coming true; for the strain of a serious war, far from having slackened, according to prediction, the ties that bind the members of the British family, has only drawn them more closely, and *Canada Federata* and *Australia*

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As a political history, the work is somewhat lacking in proportion, and the writer can lay no claim to any great gift of portraiture. His characterisations of the leading men of Canada give one the impression of an extreme uniformity of type. This want of distinctness may be in part due to the composition of Canadian ministries, which have always been dominated by, and sometimes exclusively composed of, members of the legal profession. The same feature is being reproduced in the new federal ministry of Australia, whence the complaint reaches us that seven out of the nine members of the Cabinet are lawyers.

The reader will have gathered that the book is written in a spirit of sincere and unaffected loyalty, and the note of the whole is that of a sane imperialism according well with the prevailing temper of our times.

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To the happy union of these mechanical arts we are indebted for our knowledge of the world's masterpieces, which, a few years ago, were only to be known by actually visiting the museums and picture galleries in which they were stored, or by studying them in engravings that rarely gave exact ideas of the originals.

Undoubtedly this has greatly extended the knowledge of the best art, and has set up a standard that must result in good. Already, in many elementary schools, the wall decoration is immeasurably above anything dreamt of even so short a time as twenty years ago. But much remains to be done; and here America leads the way.

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Recognising this, the University of the State of New York determined first to seek the advice of competent authorities, and then to publish a hundred photographs that should embrace representative art of all times, countries, and styles. The book before us is the illustrated catalogue of these works, admirably photographed, beautifully printed, and with pithy notes, followed by a list of authorities that the enthusiastic teacher might like to consult.

* Home Education Department, University of the State of New York.

The plan is simplicity itself. Pictures are sent framed to all schools that care to pay a small sum for the loan. At the end of the academic year these pictures are changed, and so in the course of time travel even to remote cities. The university recognises a fact not yet driven into the heads of many well-meaning people: it is not enough to put a person in the presence of fine pictures; he must be made to see something of their beauties, or be enlivened with their meaning.

It is gratifying to find that many of the pictures, sculptures, and buildings here so beautifully printed, have already appeared in *The Practical Teacher's Art Monthly*, in which an endeavour has been made to carry out the principles advocated by the American university—to give not merely a reproduction of the picture or what not, but to draw attention to beauties and interests that might otherwise escape notice.

We do not know whether this book can be procured in England. If not, it would be to the interest of some publisher to arrange with the University of New York to bring such an excellent work before our own countrymen.

MODERN LANGUAGE TEACHING.

IV. THOMAS NELSON AND SONS' FRENCH WALL SHEETS.

(*To accompany the "Méthode Naturelle pour apprendre le français:" French Phonetic Drill Sheets.*)

The ancient methods of language teaching possessed one great advantage. They demanded very little of the teacher in the matter of mental equipment and apparatus. All that he needed was what our Gallic neighbours term *un fier aplomb*, a First French Course, and—a key. The new methods require more brain-work and more apparatus; and it is the purpose of the wall sheets and text-book before us to help to supply these needs.

Mr. Hogben's excellent manual, complete in 330 pages (or in separate parts), written entirely in French, comprises a series of 160 carefully-planned lessons, with numerous suggestions for both oral and written work. At the end there are a short grammar in French, a specimen of French parsing for those teachers who cannot find anything better for their pupils to do, some English passages for translation into French, and the usual vocabulary. A list of French sounds is given, and we are glad to note that no attempt is made to represent them in English spelling. We hope the book will fall into the right hands—into the hands of the teacher who has arrived at the conclusion that the old method must be abandoned, and who is considering how best to introduce reforms.

It is a great change from the old to the new. The old-fashioned French text-book is phenomenal for dullness and monotony; the striking feature of the work we are considering is its life and variety. A French lesson given in the old style could be described in a few words. Read the rules and expound them; let the pupils commit to memory the list of words, translate orally the French exercise into English, and translate in writing the English into French. If a French reading book is used, translate that also.

The French lesson of the new style cannot be dismissed thus summarily. To begin with, illustration is a necessity; and the illustrations in the *Méthode Naturelle* number upwards of a hundred, ranging from pictures representing objects which could easily be brought into the classroom or sketched rapidly on the blackboard, to representations of a village or a railway station, in which case the large wall sheet becomes an invaluable aid. Then, too, since the teacher and pupils are *using* French in class, it follows that the work may present as infinite a variety as the language itself. This becomes evident at once to any one who examines the *Méthode Naturelle*. The teacher places an interesting picture before the class, describes it simply and clearly, introducing only a few new difficulties each time, and alternating description with question and answer. This picture practice is a bright, even fascinating exercise for children, but it is only one out of a host of teaching devices; indeed, it should not be employed at first. The best commencement probably is to teach the children to understand and execute directions given in French. *Voilà* and *montre-moi* will enable the children to acquire a good stock of nouns; while the teacher

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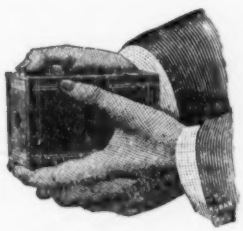

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need not be reminded what a number of *actions* pupils can perform in class. Let them perform these actions at a French word of command, and thus acquire a store of verbs.

When the class has had some practice in learning to *understand* spoken French, the teacher will commence making the children *speak* about things around him in the classroom, or portable objects which can conveniently be brought into class, or subjects which can be rapidly sketched on the blackboard. Lastly, he resorts to the large picture corresponding to the small engraving in the text-book. The fifteen sheets published by Messrs. Nelson and Sons to accompany the *Méthode Naturelle* are about 30 in. by 20 in., and each picture includes a large number of objects, so that varied practice may be secured and a large vocabulary acquired.

As to when written work and grammatical exercises should begin, there is such a mass of conflicting opinion that each teacher must think the question out for himself. Mr. Hogben introduces grammatical work almost at the commencement with simple exercises such as "Soulignez les verbes." Written work he begins at the fourth lesson, but discusses every action in French: "Voici le tableau noir; voici la craie; j'écris sur le tableau noir avec la craie." Many teachers will be inclined to postpone both grammar and written exercises to a later stage, and first lay a strong foundation by cultivating in the little pupil a glib French tongue and a quick French ear.

We have already said that the chief feature of the new methods is variety. The work of the language teacher is analogous to that required for a lively mental arithmetic lesson. There must be the same constant activity of brain, the same vigorous initiative, the same resourcefulness in framing varied and useful questions or chains of questions. The teacher will find in the *Méthode Naturelle* a mine of valuable suggestions to aid him in his arduous task—what subjects to choose as a basis for French conversation; what questions to formulate so as to impart the maximum of practical knowledge; what pictures and drawings to employ, and how to exploit them to the full; and lastly, what exercises, oral or written, are most suitable.

The first and main essential for the teacher is that he speak French with fair correctness and fluency. But it is not sufficient to place a wall sheet before the class and ask desultory questions about it. The work must be systematised, and the pupils must be constantly made to *do* something. It is the help given in this latter direction which we consider the highest excellence of the book. The pupil is told to conjugate phrases: "je récite la leçon, tu récites la leçon," etc.; "je suis content de mon sort, tu es content de ton sort," etc.; "j'étais content quand je lisais mon livre, tu étais content quand tu lisais ton livre," etc. He is asked to write sentences employing in turn singular and plural, masculine and feminine, first, second, and third person. He is required to find the verb and the subject; to form short sentences from given materials or upon a given model; to answer questions first *viva voce* and then in writing. He is told to complete elliptical sentences by supplying a suitable verb or other part of speech; he writes little essays *à la* Gouin; he reads anecdotes, fables, devinettes, proverbs, or any other subject-matter interesting to children, and the suggestive notes added to the readings are in French. Even simple lessons in geometry, geography, etc., are introduced, in order to furnish still further variety of matter.

Among all this variety, however, the three main points remain—(1) the teacher's description of the picture, by which the pupils learn to *understand* French; (2) the oral practice of question and answer, by which they learn to *speak;* (3) the little essay, developed from the preceding conversation, and by which they learn to *write* French. As to the first point, the teacher will probably surprise himself by the amount of practice which a little thought will enable him to extract from one single picture. Let us take No. 8 of Nelson's Wall Sheets as an illustration. It might be imagined that an ordinary straightforward description of the village scene, or the teaching of a few nouns and verbs, would exhaust the resources of the picture. By no means. A particular aim may be chosen, so as to give consistency to the lesson. The teacher may frame his sentences so as to bring into prominence any one of the parts of speech, say the preposition: "The church is *behind* the houses; the houses are *in front of* the church." Or he may introduce systematically some special difficulty of grammar or idiom: "The little girl has *no* kite. The man who is in the boat has *no* dog." He may draw upon his imagination and assign French names to the men in the boat, the shepherd on the bridge, and the children on the green. He may say what they are or are not, what they have or have not, what they are doing or not doing. He may create relationships between the persons. For example, the two men in the boat are brothers; the three little girls are sisters. He can give the *parts* of the church, house, bridge, or tree. He can let each person speak for himself. The man on the bridge says, "*I* am a shepherd; I have a flock of sheep in front of me; my little daughter and my dog are beside me." Contrast and comparison can be constantly woven in. "The boat is *under* the bridge; the sheep are *on* the bridge. The church is high, the tree is higher, the rainbow is highest." The teacher can ask himself rhetoric questions commencing Who? which? what? how? when? where? why? by what means? and give the reply. This latter device prepares the class for the conversation that follows.

We have not yet exhausted the resources of the language teacher who uses pictures; but as space is precious, we must ask our readers to amplify the catalogue for themselves. For the same reason, we will not discuss the oral questioning and composition, which grow naturally and obviously from this picture practice; but must pass on to another all-important consideration—French pronunciation.

It matters little what answer the teacher would give to the great question, "Why are children taught French?" Whatever aim he may have in view, the truth remains that the acquirement of an approximately correct pronunciation is a firm stepping-stone to rapid, real advance in the study. Even if the main object be merely to read French, the reply is that no real enjoyment or appreciation of French literature can exist without the power of reading French with fair speed and correctness of utterance; and the better the knowledge of French sounds, the more can be read and enjoyed in a given time. Moreover, the more exact and consistent the habits of pronunciation, the keener becomes the memory; while bad, wavering, careless pronunciation brings with it a train of awkward errors. But good pronunciation is not only an aid to memory and spelling; it is a time-saver in class. Speech is so much more rapid than writing, that when once a class has a firm hold of the sounds of the French language, very rapid progress can be made.

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Our concluding notice next month will deal with various Continental methods.

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writer has been very judicious in his selection of matter, and we can heartily recommend the book as a reader.

In another edition the slight inaccuracies, etc., will doubtless be made good. We have noted the following in perusing the pages:—Page 32, bottom line, "old" for "told." On page 63, fifth line from the bottom, the expression "by God" should be omitted. On page 54, line 3 from the bottom, 1767 should be 1797. On page 82, six lines from the bottom, Wellington is represented as possessing "gray eyes," while on page 88 he has a keen "blue eye." On page 84, Vimeiro should be Vimiera; and on this same page the firmness of Wellington's nature is represented as giving way for the first and last time, while on page 93 we are told that the Duke sat, his hands clasped together, while tears were making long white streaks down his grimy, battle-soiled cheeks. On page 98, "typhus fever" is attributed to O'Connell sitting in wet clothes. The passage referring to his income, on page 99, is very vague. On page 101, line 10, we have "petition to;" on page 103 it says, "one of his little girls came by turns;" line 9, page 106, should read, "much the same lines as;" page 129, bottom line, one "and" should be deleted; and line 16, page 139, should read, "on the side of the mountain."

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After this bare mention of names, it would be a work of supererogation to praise the selection. Not that this is all. For here are capital notes on natural history, on travels in far-off lands, and simple stories—all excellently illustrated. And to any one who believes in the educational power of pictures, when rightly used, these readers are especially interesting.

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I should like to point out that in the editorial preface to these solutions (page 79) it is stated that the solutions, for example in history, occasionally go beyond the limits of an examination answer, and that the reader must understand that full marks could be gained for a less complete treatment of the subject. In setting forth the objects with which the Court of Star Chamber was established, the writers of these solutions could, it seems to me, hardly have done better than quote the most pertinent passages of the original statute, inasmuch as any other form which a correct answer might have taken would have been derived, directly or indirectly, from this source.—I am, sir, yours faithfully,

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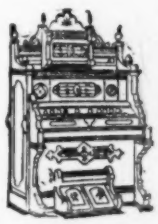

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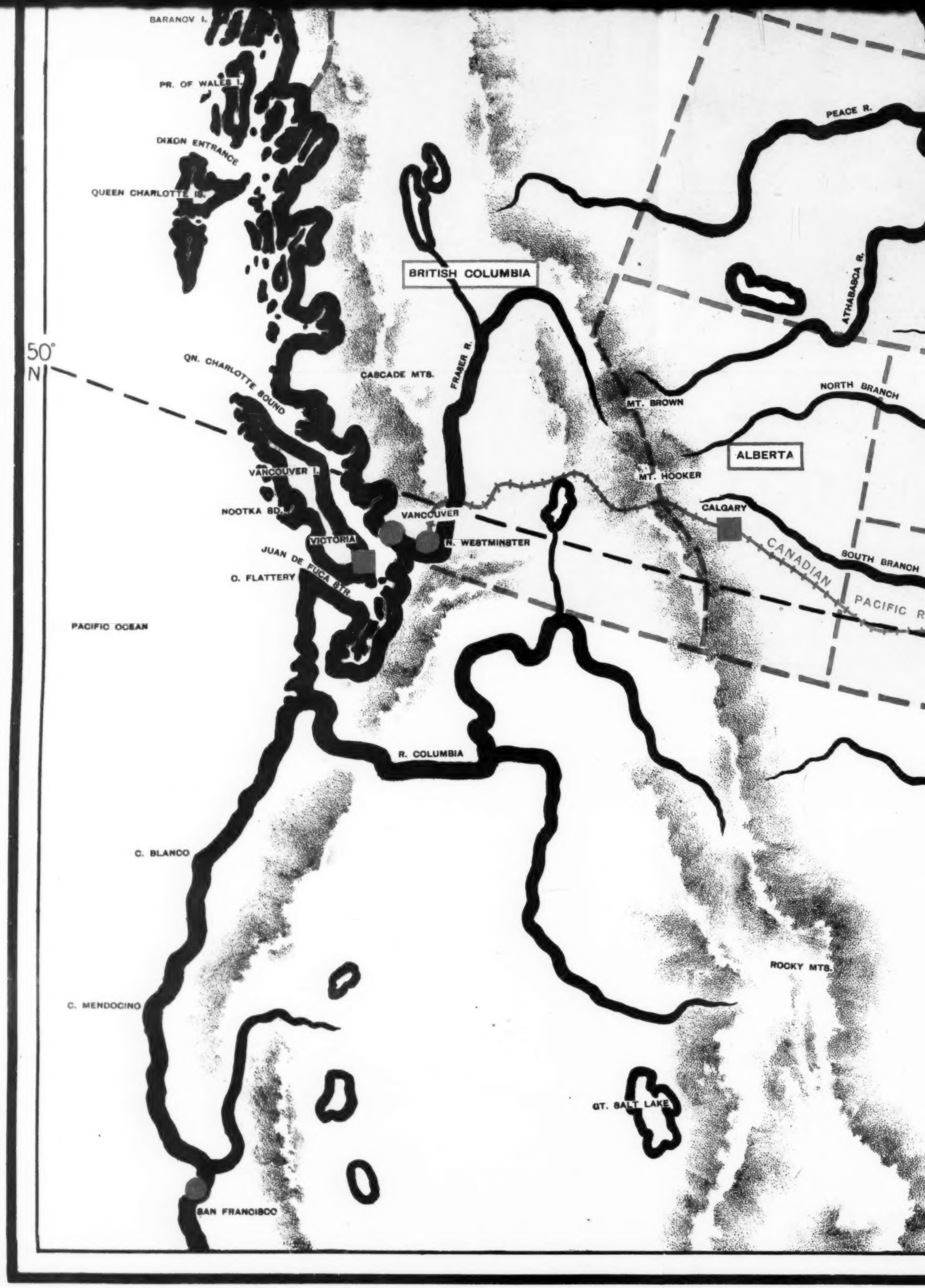

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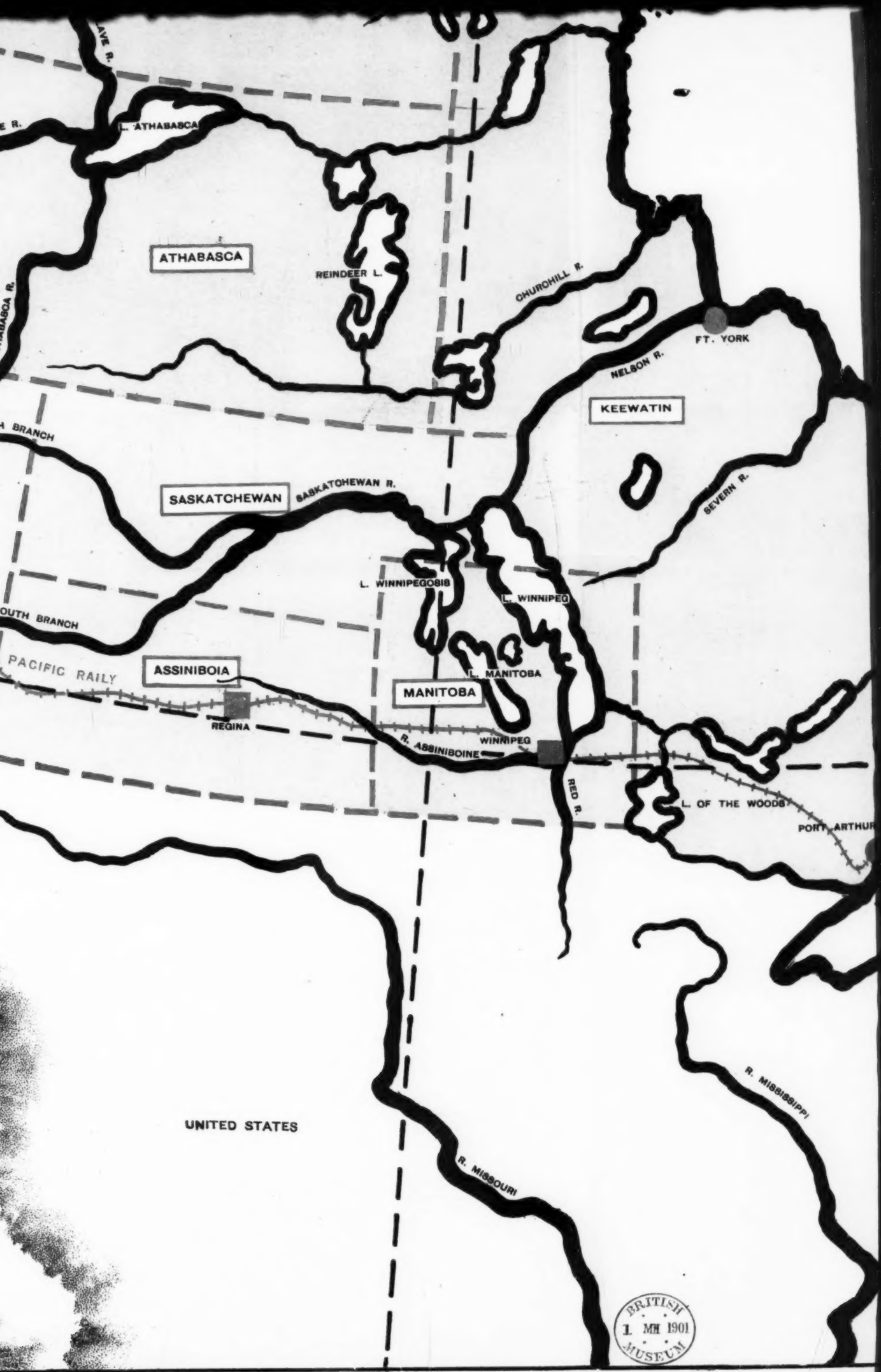

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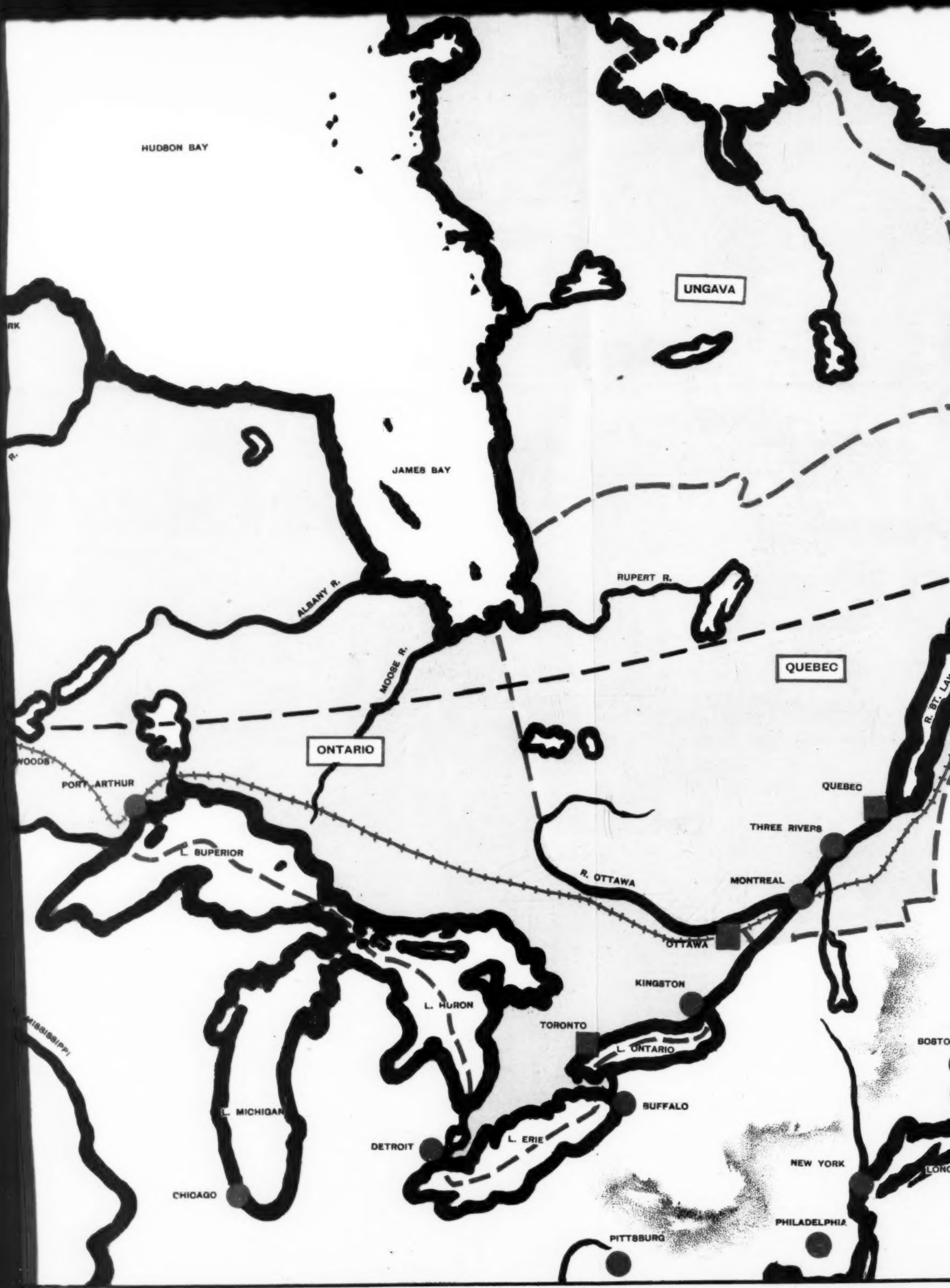
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